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Revision of *Neosuarius*, a subgenus of *Chrysopodes* (Neuroptera, Chrysopidae)

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Abstract

The Neotropical green lacewing genus *Chrysopodes* includes two described subgenera: *Chrysopodes* and *Neosuarius* with 30 and 19 named species, respectively. This paper, which initiates a revision of the genus, focuses on *Neosuarius*. First, the paper re-defines the suite of traits that characterizes the subgenus; in doing so, it limits the taxon to a smaller, and more cohesive set of species than was included earlier. Then, because most previous descriptions are brief and have no reference to the genitalia, it re-describes and illustrates the adults of species assigned to the newly re-defined subgenus. For each species, it also provides a diagnosis, complete synonymy and list of literature citations, and information on the known biology and distribution. To stabilize the subgenus and reduce nomenclatural problems in the future, special emphasis is placed on the type specimens of all species in the subgenus and their synonyms.

Taxonomic changes include: (1) The previous synonymization of *Chrysopa krugii* Kolbe, 1888 with *Chrysopodes* (*Neosuarius*) *collaris* (Schneider) is reversed, and *Chrysopodes* (*Neosuarius*) *krugii* (Kolbe) is recognized as a distinct biological entity. (2) Five species [*C.* (*N.*) *apurinus* (Navás, 1935), *C.* (*N.*) *divisus* (Walker, 1853), *C.* (*N.*) *placitus* (Banks, 1908), *C.* (*N.*) *poujadei* (Navás, 1910) and *C.* (*N.*) *karinae* Freitas & Penny, 2001] are removed from the subgenus. (3) Three *C.* (*Neosuarius*) species are synonymized with previously described *C.* (*Neosuarius*) species – *jaffuelinus* (Navás, 1918) and *nosinus* (Navás, 1913) with *Chrysopodes* (*Neosuarius*) *flavescens* (Blanchard, 1851), and *tristellus* (Navás, 1920) with *Chrysopodes* (*Neosuarius*) *porterinus* (Navás, 1910). (4) Three species that were previously designated as "*Chrysopa* (*incertae sedis*)" are synonymized with *C.* (*Neosuarius*) species – *Chrysopa bullocki* Navás, 1933, with *C.* (*N.*) *flavescens* (Blanchard, 1851)]; *Chrysopa ruizi* Navás, 1934, with *C.* (*N.*) *porterinus* (Navás, 1910); and *Chrysopa tacorensis* Navás , 1934, with *C.* (*N.*) *figuralis* (Banks, 1915). *Chrysopa dampfina* Navás, 1927, is

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moved from synonymy with *C.* (*N.*) *figuralis* to synonymy with *C.* (*N.*) *collaris*. Lectotypes or holotypes are identified for all species and synonyms.

As a result of this study, the subgenus *Chrysopodes* (*Neosuarius*) now contains 10 species in two distinct species-groups: (1) the *collaris* species-group: *C.* (*N.*) *collaris* (Schneider, 1851), *C.* (*N.*) *figuralis* (Banks, 1915), *C.* (*N.*) *krugii* (Kolbe, 1888), and *C.* (*N.*) *oswaldi* Penny, 2002; (2) the *flavescens* species-group: *C.* (*N.*) *escomeli* (Navás, 1922), *C.* (*N.*) *flavescens* (Blanchard, 1857), *C.* (*N.*) *nigricubitus* Tauber and Tauber, 2010, *C.* (*N.*) *nigripilosus* (Banks, 1924), *C.* (*N.*) *pecki* Tauber and Tauber, 2010, and *C.* (*N.*) *porterinus* (Navás, 1910).

Keywords

Chrysopodes, Neosuarius, New World, revision, taxonomy

Introduction

It is generally recognized that the neotropical green lacewing fauna (Neuroptera: Chrysopidae) is in great need of descriptive and revisionary systematic work (Adams and Penny 1985, Tauber and Adams 1990, Brooks 1997). Despite some recent regional and generic-level treatments (e.g., Freitas and Penny 2001, Penny 2002, Tauber 2007, Tauber et al. 2008a, b, c), most neotropical species are described in a minimal fashion; most genera have not been revised, reviewed, or well-delineated; and, specimens are difficult to identify even to the level of genus. As a result, ecological and other research with the family has largely been limited to a few, well-known and easily identified species (Albuquerque et al. 2001).

Originally, this project was intended to revise the entire, relatively large (~50 described species) neotropical genus *Chrysopodes* Navás 1913. However, soon after the work began, it became apparent that the project would take extended time. First, the genus and its two included subgenera were not well characterized, and they each contain a significant number of species that should be re-assigned (in most cases to poorly characterized or undescribed taxa). Second, a number of species currently assigned to other genera [primarily old names assigned to "*Chrysopa*" *incertae sedis* by Brooks and Barnard (1990)] may belong in *Chrysopodes*. Re-assignment of these mis-assigned species to the correct genera and subgenera would require careful examination of a large number of types from a broad range of chrysopine genera, many of which are held in foreign museums.

One solution to the above problems is to review the subgenera serially, rather than in one treatment. Such an approach has both positive and negative implications. The main advantage is that information, which has long been lacking, would be available within a short period. The primary risk is that taxonomic changes based on only some of the species may lead to errors that will need correction when the remaining species are examined. In weighing the alternatives, I decided that the positive outcomes of the serial treatment of the genus would greatly outweigh the

negative, and thus this paper treats one section of the genus *Chrysopodes* – the subgenus *Neosuarius*.

The study comprises an alpha-level treatment of adult morphological traits. It begins by examining the generic and subgeneric assignment of each species that is presently included in the subgenus. It then presents a key to the included species and treats the species individually. Specifically, for each species it provides previous and new synonymies, full literature references, information on the type locality, diagnostic characteristics, re-descriptions for all but three species that were recently described (Tauber and Tauber, 2010), and a summary of available information on the type specimens (including designation of new lectotypes). Treatment of larvae and a cladistic analysis will accompany the revision of the remaining *Chrysopodes* species.

Materials and methods

Specimens examined. This study would not have been possible without the use of specimens held in collections from around the world and without the help of the curators in charge of these collections. Three collections have particularly rich *C.* (*Neosuarius*) material: the Florida State Collection of Arthropods (largely collected by L. A. Stange and R. Miller), the Smithsonian Collection (notably gathered by O. S. Flint), and the California Academy of Sciences (especially that donated by P. A. Adams). Below are the institutions that loaned specimens or provided images, their acronyms used in this publication, and the curators/colleagues who facilitated loans and/or offered images and information:

AMNH American Museum of Natural History, New York, NY (D. A. Grimaldi, T. Nguyen)
ANSP Academy of Natural Sciences of Philadelphia, PA (J. D. Weintraub)
BMNH The Natural History Museum, London, formerly British Museum of Natural History, London, England (D. Goodger, S. Brooks)
BPBM Bernice P. Bishop Museum, Honolulu, HI (N. L. Evenhuis, S. Myers)
CAS California Academy of Sciences, San Francisco (N. D. Penny, D. H. Kavanaugh)
CMNH Carnegie Museum of Natural History, Pittsburgh, PA (J. E. Rawlins)
CNC Canadian National Collection, Ottawa, Canada (J. Poirier, E. Rickey)
CSUFC C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins (B. C. Kondratieff)
CUIC Cornell University Insect Collection, Ithaca, NY (J. K. Liebherr, E. R. Hoebecke)
FMNH Field Museum of Natural History, Chicago, IL (M. K. Thayer, J. H. Boone)
FSCA Florida State Collection of Arthropods, Gainesville (L. A. Stange)
INHS Illinois Natural History Survey, Champaign (C. Favret)

IRSNB Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium (L. Baert)
KU Snow Entomological Museum, University of Kansas, Lawrence, KS (J. S. Ashe, Z. H. Falin)
LACM Los Angeles County Museum of Natural History, CA (B. V. Brown, W. Xie)
MCT M. J. and C. A. Tauber Research Collection
MCZ Museum of Comparative Zoology, Harvard University, Cambridge, MA (P. Perkins, S. P. Cover,)
MEM Mississippi State Entomological Museum, Mississippi State, MS (R. L. Brown, J. Hill)
MNHN Muséum national d'Histoire naturelle, Paris, France (J. Legrand)
MZB Natural History Museum of Barcelona, formerly the Zoology Museum of Barcelona (V. Monserrat, Universidad de Complutense, Madrid, Spain)
MZSP Museu de Zoologia da Universidade São Paulo (S. Vanin, C. J. Einicker Lamas, C. Campaner)
NMS National Museum of Scotland, Edinburgh (R. Lyszkowski)
OSU Oregon State Arthropod Collection, Oregon State University, Corvallis (C. J. Marshall)
ROM Royal Ontario Museum, Toronto (D. C. Darling)
SDEI Senckenberg Deutsches Entomologisches Institut, Müncheneberg, Germany (C. Kutzscher, A. Taeger)
SDNHM San Diego Natural History Museum, CA (M. A. Wall)
TAMU Texas A & M University Insect Collection, College Station (J. D. Oswald, E. G. Riley)
UAZ University of Arizona, Tucson (C. Olson)
UCB Essig Museum, University of California, Berkeley (C. B. Barr)
UCD Bohart Museum, University of California, Davis (Lynn Kimsey, S. L. Heydon)
UID W. F. Barr Entomological Collection, University of Idaho, Moscow (J. B. Johnson)
UMMZ Museum of Zoology, University of Michigan, Ann Arbor, MI (B. M. O'Conner)
UMIN University of Minnesota Insect Collection, St. Paul, MN (P. J. Clausen)
USNM National Museum of Natural History (formerly United States National Museum), Smithsonian Institution, Washington, DC, (O. S. Flint, D. G. Furth, T. Erwin)
USU Entomological Museum, Utah State University, Logan, UT (C. D. von Dohlen)
ZMB Museum für Naturkunde, Humboldt University, Berlin, Germany (M. Ohl)
ZSM Zoologische Staatssammlung München, Munich (E.-G. Burmeister)

Literature, resources and label data. One of the most valuable resources, especially at the beginning of this project, was a copy of the notes that Phillip A. Adams made during his visits to European and New World museums. Upon Phil's death, these notes were bequeathed to the California Academy of Sciences; subsequently, Norman D. Penny made the section on *Chrysopodes* available for my use. The notes helped identify the location of types, the existence of specimens in collections, and references to literature; they also provided Phil's insights into possible synonymies and other taxonomic issues. Except in rare cases noted in the text, I re-examined the types and literature included in the notes; the conclusions (and any errors) are my own.

The websites, "Neuropterida Species of the World" (Oswald 2007) and "Bibliography of the Neuropterida" (Oswald 2006) were other valuable resources. All citations and dates of publication of original descriptions are those given in the "Lacewing Digital Library"; the websites are cited where appropriate. Type locality data reported here are in quotation marks; they are taken verbatim from the original descriptions.

Label data from type specimens are given in quotations and are verbatim; any of my comments are in square brackets, [ ]. Unless stated otherwise, the type labels are white and printed with black ink.

Procedures, terminology, and structures. The dissecting, staining, and descriptive procedures are presented by Tauber et al. (1998, 2000). Measurements were made as indicated on Figs 1–9. To establish the shape of the forewings, I measured the width at four points perpendicular to the midline: midwing, at the basal and distal quadrants, and at the widest point (see Figure 3). The width measurement and the

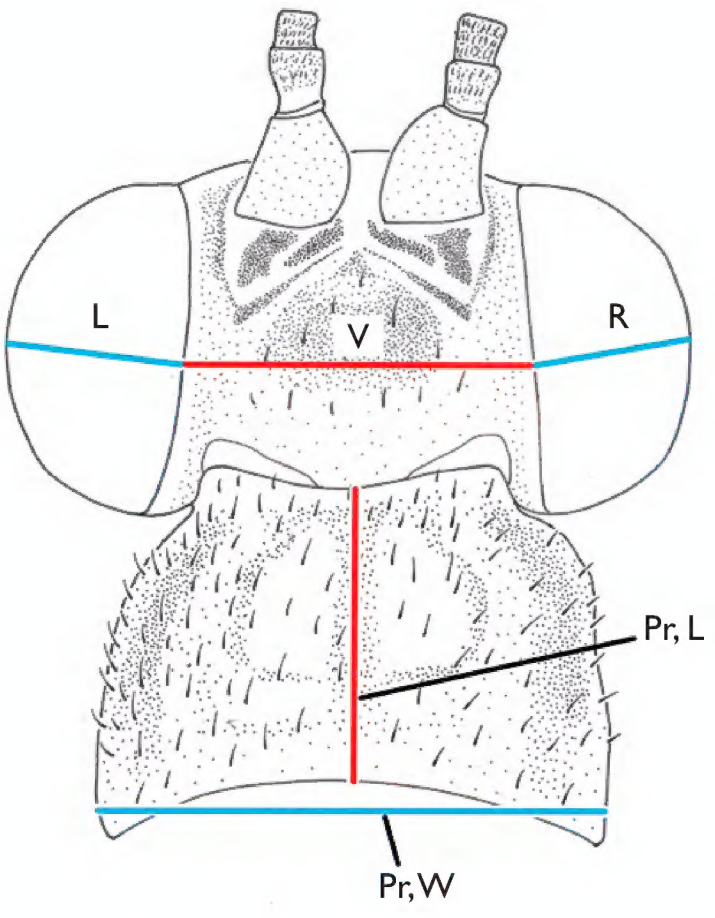

Figure 1. Measurements of head and pronotum (dorsal). **L** left eye width (blue) **R** right eye width (blue) **Pr, L** pronotal length, at midline (red) **Pr,W.** pronotal width, at base (blue) **V** vertex width (red).

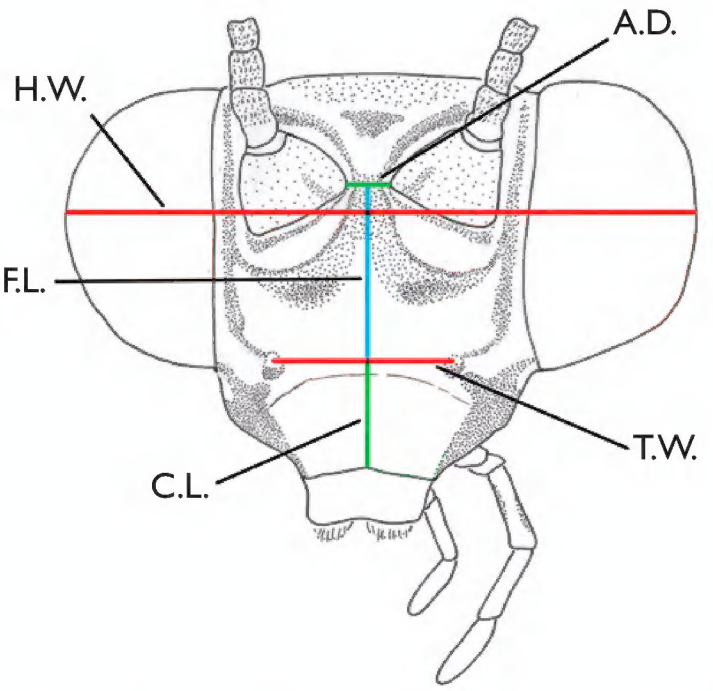

Figure 2. Measurements of head (frontal). **A.D.** distance between antennae (green) **C.L.** clypeal length (green) **F.L.** length of frons (blue) **H.W.** frontal head width including eyes (red) **T.W.** distance between tentorial pits (red).

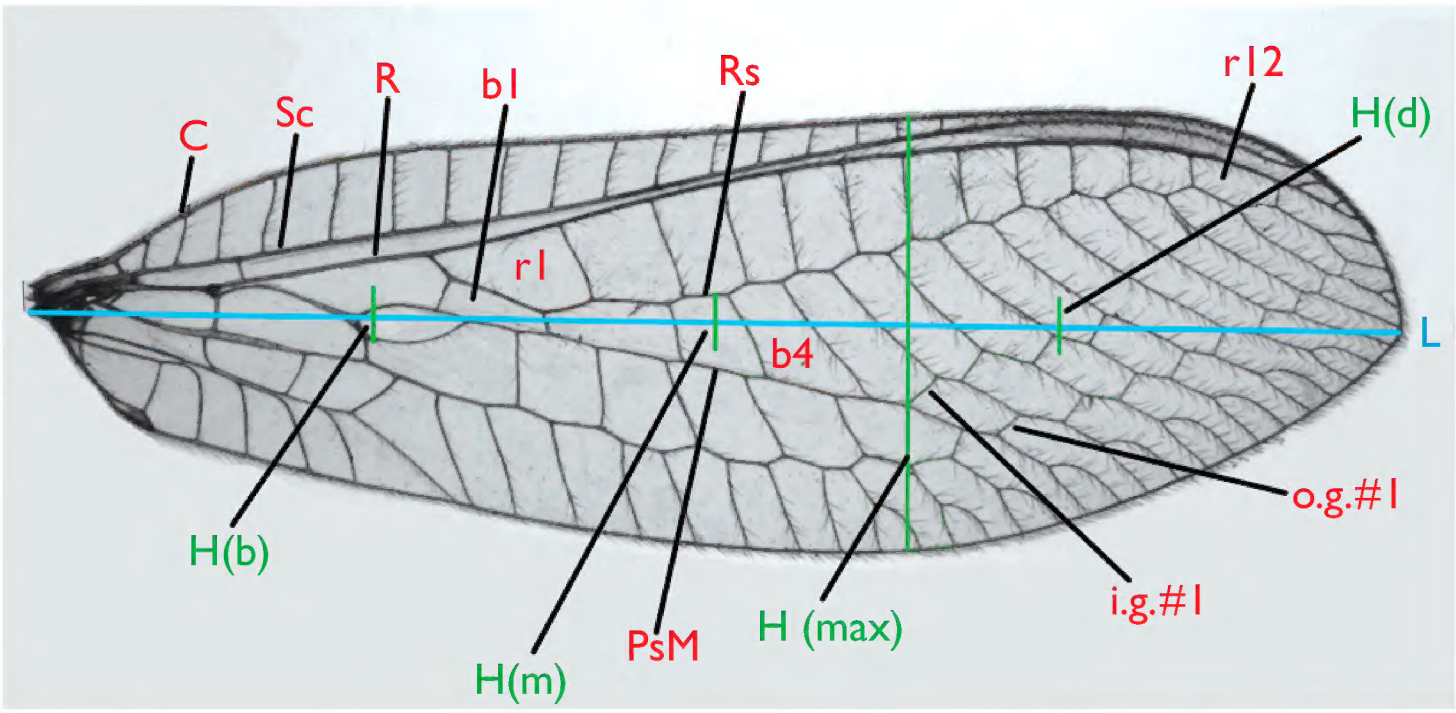

Figure 3. Forewing structures and measurements. Structures (red): **C** costa **PsM** pseudomedius **R** radius **Rs** radial sector **Sc** subcosta **b1** first upper Banksian cell **b4** fourth upper Banksian cell **i.g.#1** first inner gradate vein **o.g.#1** first outer gradate vein **r1** first radial cell **r12** twelfth radial cell. Measurements (blue, green): **L** length of forewing (blue) **H**(max), maximum height of forewing (green) **H(b), H(d), H(m),** positions on wing where height measurements were taken.

length to width ratio reported in the descriptions used the width measurement at the widest point. The length to width ratio (Fig. 1) reported for the head follows that of Brooks and Barnard (1990).

Interpretations of male and female genital structures, except as noted below, coincide with those of previous authors (Tjeder 1970, Adams and Penny 1985, Tsukaguchi 1995, Tauber 2003).

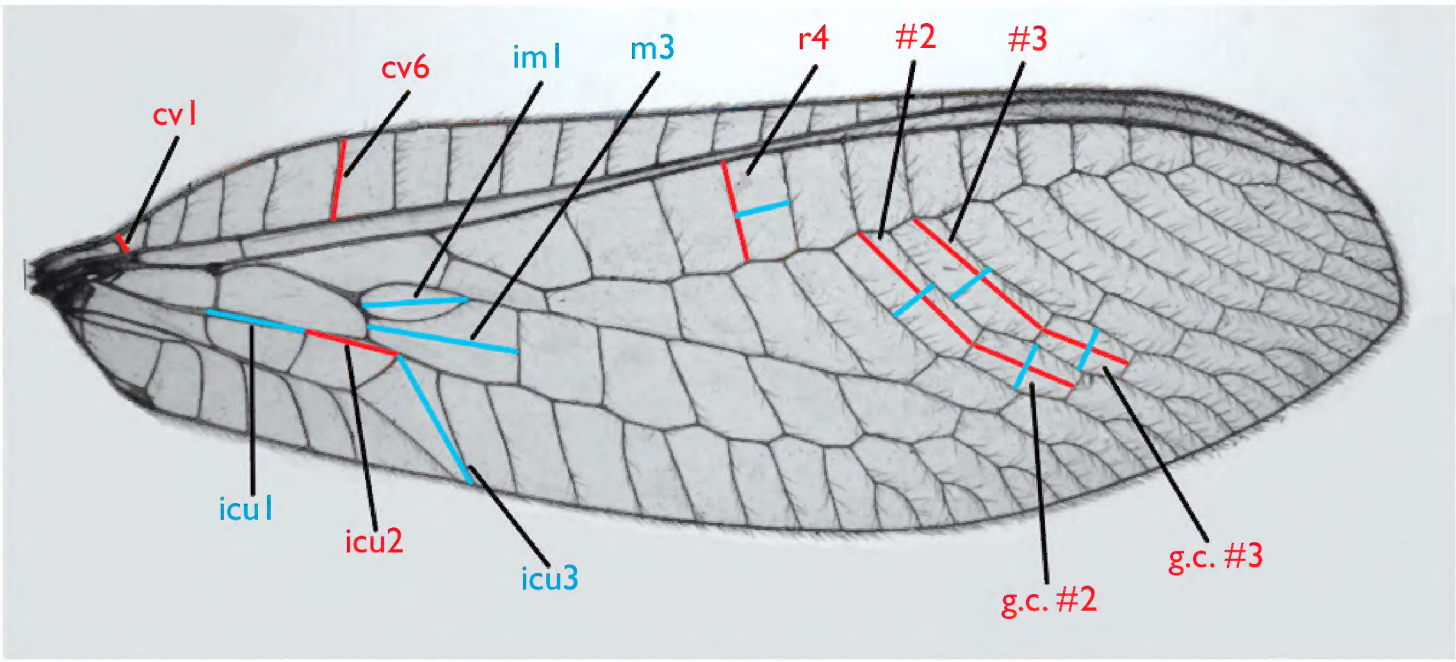

Figure 4. Forewing measurements. **cv1** height of first costal veinlet (red) **cv6** height of tallest costal veinlet (in this case, the sixth costal veinlet, red), **g.c.#2, g.c.#3** height (red) and width (blue) of first and second gradate cells (cells bounded above and below by gradate veins) **icu1, icu2, icu3** length of first (blue), second (red) and third (blue) intracubital cells **im1** length of first intramedian cell (blue) **m3** length of third median cell (blue) **r4** height (red) and width (blue) of tallest radial cell (in this case, the fourth radial cell) **#2, #3** height (red) and width (blue) of second and third cells with radial sector at base and inner gradate at tip.

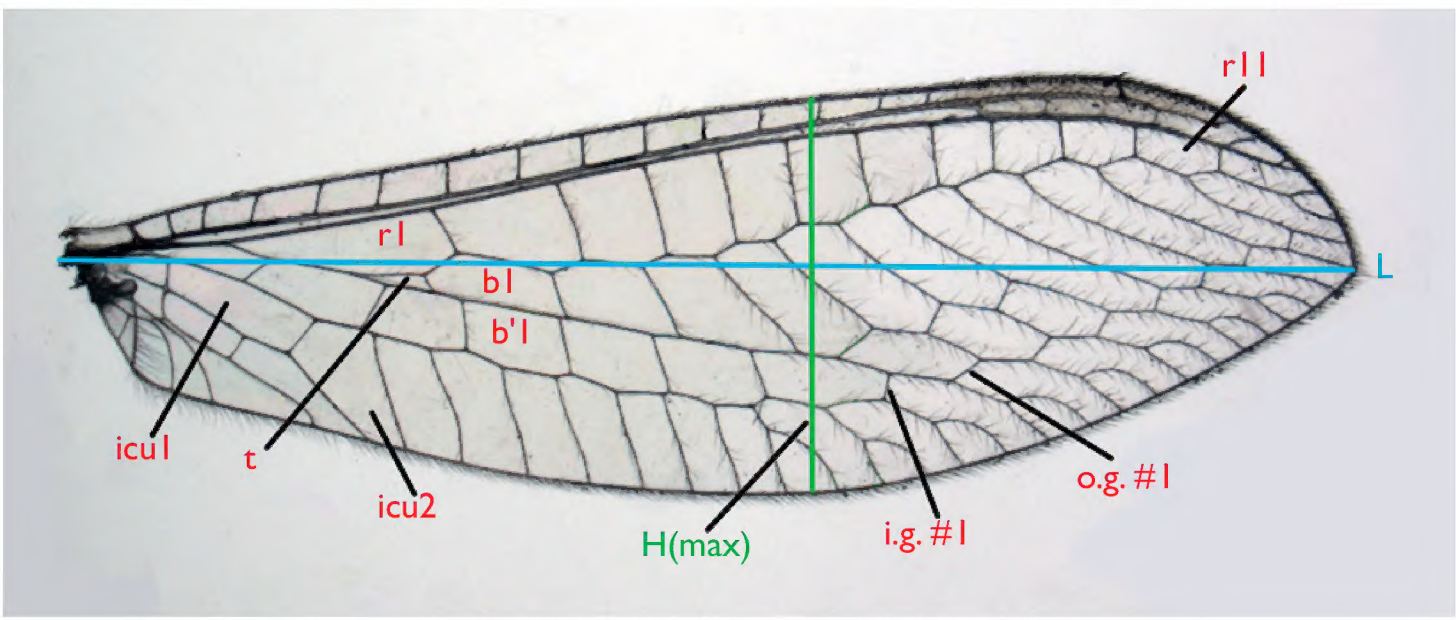

Figure 5. Hindwing structures and measurements. Structures (red): **b1** first upper Banksian cell **b'1** first lower Banksian cell **icu1, icu2** first and second intracubital cells **i.g.#1** first inner gradate vein **o.g.#1** first outer gradate vein **r1** first radial cell **r11** eleventh radial cell **t** minute triangular cell. Measurements (blue, green): **L** forewing length (blue) **H**(max), maximum forewing height (green).

Mediuncus. In some chrysopid genera, such as *Chrysopodes*, the median process that extends from the upper part of the gonarcus tapers distally to a sharp or blunt, recurved beak; although the process may articulate with the gonarcus, it is without an internal articulation or lateral flanges. This structure has been referred to as the "mediuncus" (Adams and Penny 1985) or the "arcessus" (Tjeder 1966, Tsukaguchi 1995, Aspöck 2002, Penny 2002). In some other chrysopid genera, the process is articulated,

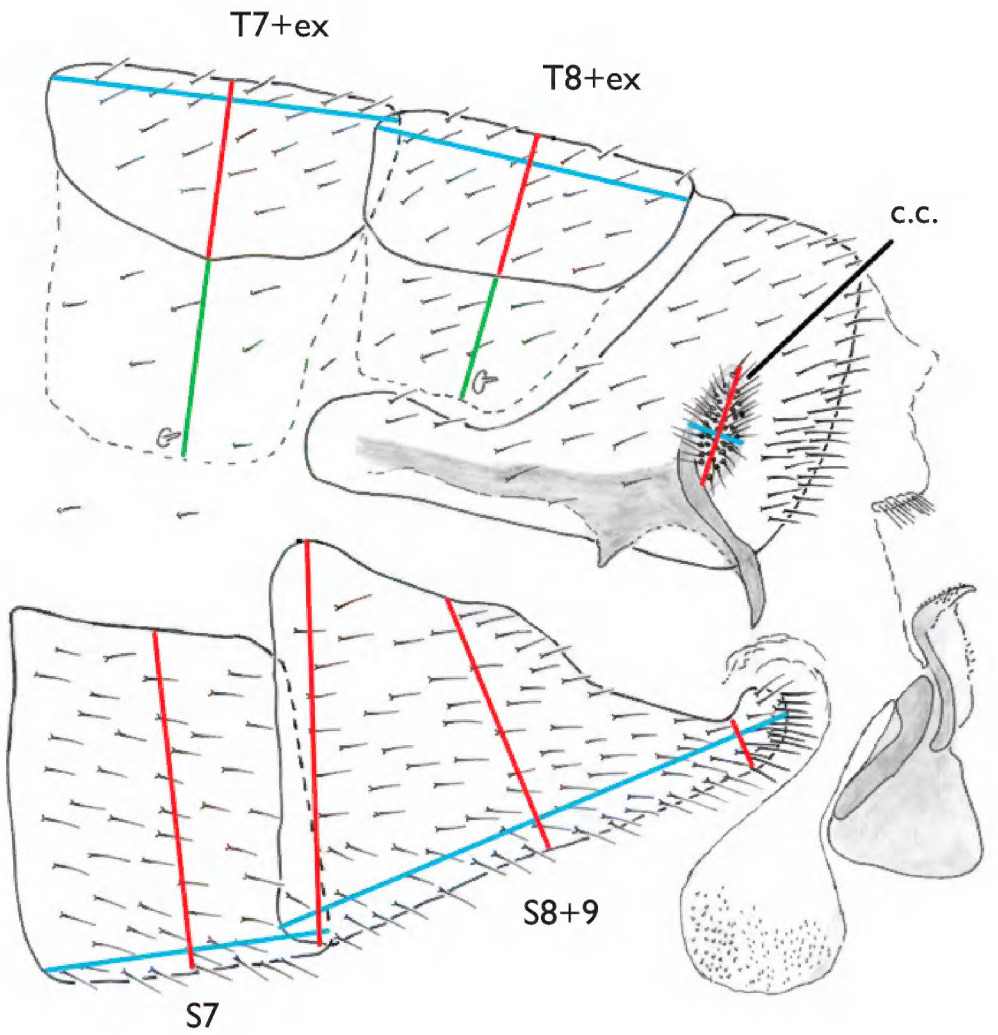

Figure 6. Measurements of male abdomen (exterior, lateral) on cleared specimen mounted in glycerin on slide with coverslip. **c.c.** callus cerci: maximum length (blue), maximum height (red) **S7** seventh sternite: length along ventral margin (blue), height at midline, perpendicular to base line (red) **S8+9** fused eighth and ninth sternites: length along ventral margin (blue), height (red) along basal margin (red), perpendicular to base line at midsegment (red), perpendicular to base line at distal end (red) **T7+ex** seventh tergite plus lightly sclerotized extension: length along dorsal surface (blue), height of tergite at midsegment perpendicular to length (red); height of extended section at midsegment perpendicular to length (green) **T8+ex** eighth tergite plus lightly sclerotized extension: length along dorsal surface (blue), height of tergite at midsegment perpendicular to length (red); height of extended section at midsegment perpendicular to length (green).

and authors have referred to the basal portion as the "mediuncus" and the distal portion as the "arcessus" (Tjeder 1970, Brooks and Barnard, 1990; Freitas and Penny 2001). The relationship (homology) of the structure in *Chrysopodes* to the "mediuncus" and "arcessus" of these authors is not clear (see Aspöck 2002). Consequently, here, I retain the terminology of Adams and Penny (1985), and I use the term "mediuncus" to refer to the unarticulated median process extending from the upper part of the gonarcus. This usage is consistent with my previous publications on this and other genera. However, it should be understood that this structure may not be homologous with similarly named structures in other neuropteran families and other chrysopid genera.

Type designations. As in a previous study (Legrand et al. 2008), I took a conservative approach when determining holotypes and designating lectotypes when only one

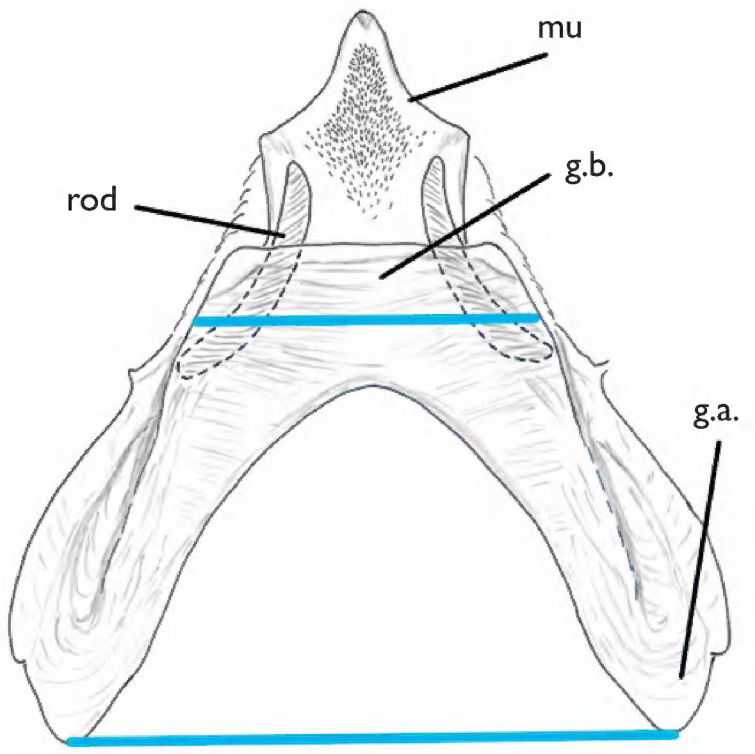

Figure 7. Measurements and structure of gonarcus (dorsal). **g.a.** gonarcal apodeme, distal span (blue) **g.b.** gonarcal bridge, width along midline of bridge (blue); **mu** mediuncus **rod** internal sclerotized rod of mediuncus.

syntype was found. If the original description did not indicate that a single type was designated, I assumed that the number of syntypes is unknown or greater than one. I then followed Recommendation 73F of the International Code and designated a lectotype. Also, if previous authors had considered any such specimen as a "holotype", I retained the specimens as the primary type and noted its new designation as a lectotype.

Chrysopodes Navás, 1913

Navás (1912–1913) described the genus *Chrysopodes* on the basis of external adult features. Although the taxonomic value of chrysopid genitalic characters was recognized early in the 1950s (e.g., Principi 1949, 1954; Tjeder 1954); the structures were not included in the treatment of any neotropical taxa until the mid-1970s (Adams 1975). As a result the genus *Chrysopodes* remained poorly characterized until the mid 1980s when Adams (1985) and Adams and Penny (1985) included these characters in their treatment of the Amazonian species. Currently, the genital characteristics (especially those of females) remain undescribed for many *Chrysopodes* species.

In their work, Adams and Penny (1985, 1986) also recognized the diversity of species contained within *Chrysopodes,* and they subdivided the genus into two subgenera: *Chrysopodes* with sickle-shaped mandibles and *Neosuarius* with broadly-based mandibles. Brooks and Barnard (1990), in their worldwide review of chrysopid genera, accepted the subgeneric classification; they provided re-descriptions of

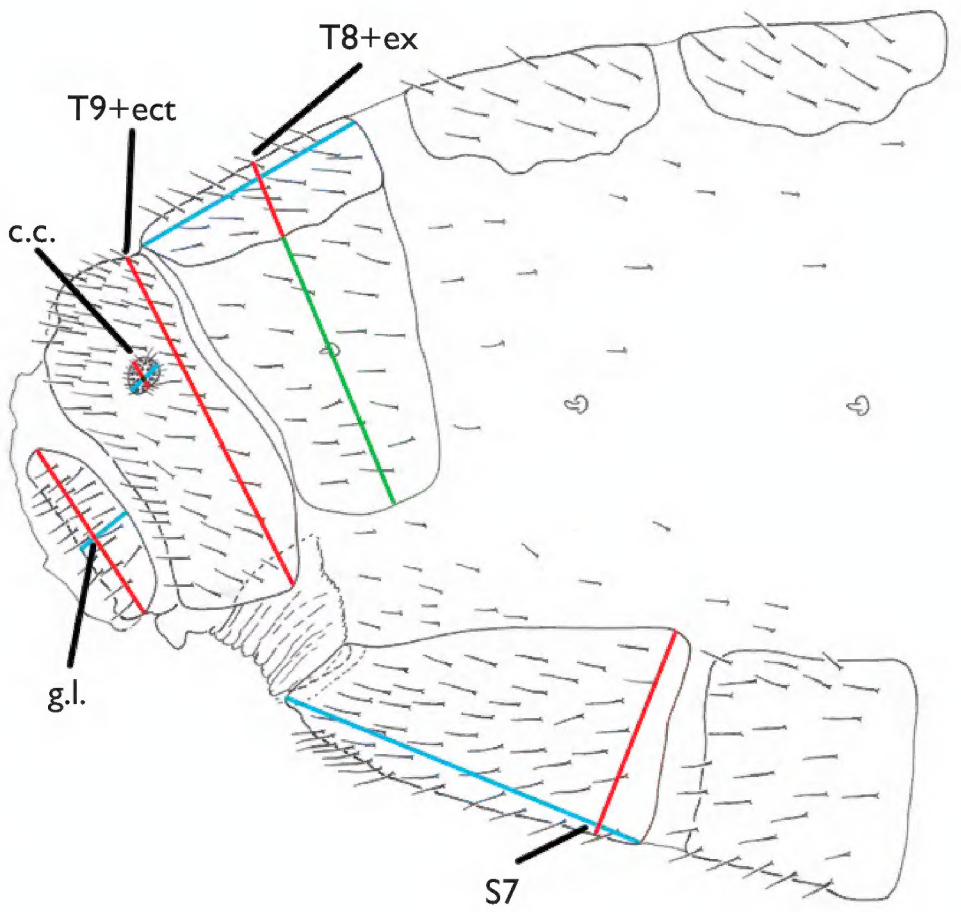

Figure 8. Measurements of female abdomen (exterior, lateral) on cleared specimen mounted in glycerine on slide with coverslip. **c.c.** callus cerci: maximum length (blue), maximum height (red) **g.l.** gonapophysis lateralis: length at midpoint (blue); maximum height (red,) **S7** seventh sternite: length along ventral margin (blue); maximum height along basal margin and perpendicular to baseline (red) **T8+ex** eighth tergite plus lightly sclerotized extension: length along dorsal surface (blue), height of tergite at midsegment (red); height of extended section at midsegment (green); **T9+ectoproct**: maximum height along anterior margin (red).

the genus and the two subgenera; and they assigned numerous species to one or the other subgenus.

Unfortunately, the mandibular character-states used to differentiate the subgenera were not clearly defined or consistently applied. As a result, the species assigned to them did not form readily apparent natural groupings. Moreover, the subsequent inclusion of new species (Penny 2001) and species transferred from other genera (Tauber 2003) increased the degree of diversity included within the genus and further confounded the limits of the two subgenera. Consequently, it has become increasingly difficult to characterize the genus and assign species to its subgenera. Some of the problems were discussed by Tauber (2003).

With the goal of addressing the above issues, I examined the generic placement of each species included in the subgenus *Neosuarius* and narrowed the definition of the subgenus to those species with mandibles that are broad throughout their full length (from base to tip, not merely at the base, as apparently was the case previously). This restriction resulted in the identification of several additional features that helped delin-

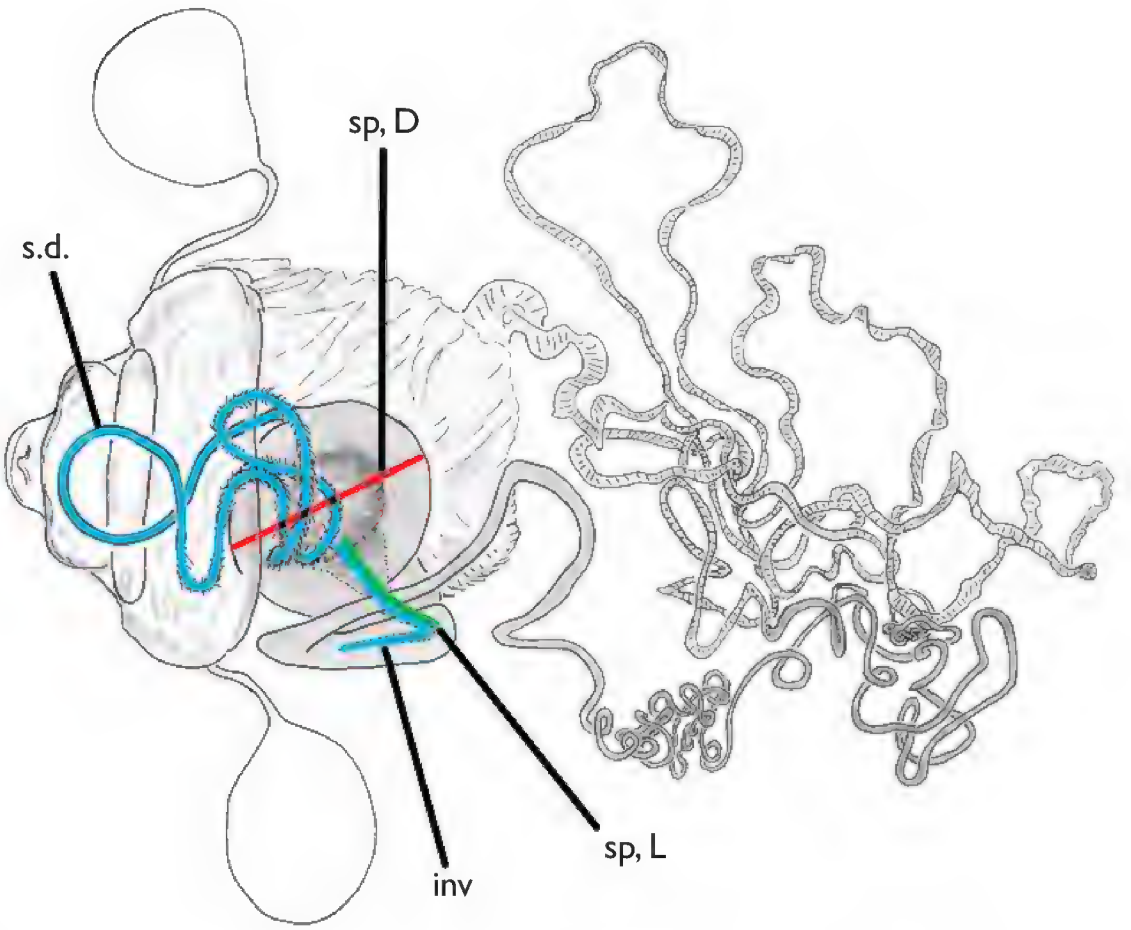

Figure 9. Female genitalia (ventral), measurements. **inv** spermathecal invagination, length (blue) **s.d.** spermathecal duct, length (blue) **sp,D** diameter of spermatheca, maximum (red) **sp,L** length of spermatheca, to first bend (green).

eate a cohesive subgenus containing two well-differentiated species-groups. This subgenus, *Neosuarius*, is revised herein. The remainder of the species (those with mandibles that are sickle-shaped distally) appear to fall within two or three other subgenera.

Chrysopodes Subgenus *Neosuarius*

Before the publication of this study, 19 species were assigned to *Chrysopodes* subgenus *Neosuarius*; 17 were listed in the "Neuropterida Species of the World" on-line catalogue (Oswald 2007) and an additional two were recently described (Tauber and Tauber, 2010; see Table 1 here). Five of the listed species [*C.* (*N.*) *apurinus, C.* (*N.*) *crassipennis, C.* (*N.*) *divisus, C.* (*N.*) *placitus,* and *C.* (*N.*) *poujadei*] do not fit the new, restricted definition of the subgenus proposed here; they are removed from the subgenus and will be treated elsewhere. Specimens of *Chrysopodes* (*Neosuarius*) *karinae* Freitas and Penny, 2001, were not made available. Thus, the species' taxonomic placement is unconfirmed.

As a result of the current study, *Chrysopodes* subgenus *Neosuarius* now includes ten species that express the following suite of traits: (i) mandibles that are broad throughout, not only at the base (Fig. 10); (ii) mesal margin of left mandible with rounded, knob-like projection (Fig. 10); (iii) mesal margin of right mandible rounded, without a knob (Fig.

Table 1. Species assigned to *Chrysopodes (Neosuarius)* before the publication of this study (as listed in Oswald 2007) and their taxonomic status after the study. The six species that are marked with an asterisk do not fit the re-defined definition of the subgenus proposed here.

**Chrysopodes (Neosuarius) apurinus* (Navás, 1935) [good species in genus *Chrysopodes*, subgenus *incertae sedis*]
Chrysopodes (Neosuarius) collaris (Schneider, 1851) [good species in subgenus *Neosuarius;* type species of subgenus *Neosuarius*]
**Chrysopodes (Neosuarius) crassipennis* Penny, 2001 [good species in genus *Chrysopodes,* subgenus *incertae sedis*]
**Chrysopodes (Neosuarius) divisus* (Walker, 1853) [good species in genus *Chrysopodes*, subgenus *incertae sedis*]
Chrysopodes (Neosuarius) escomeli (Navás, 1922) [good species in subgenus *Neosuarius*]
Chrysopodes (Neosuarius) figuralis (Banks, 1915) [good species in subgenus *Neosuarius*]
Chrysopodes (Neosuarius) flavescens (Blanchard, 1851) [good species in subgenus *Neosuarius*]
Chrysopodes (Neosuarius) jaffuelinus (Navás, 1918) [**New synonym** of *C. (N.) flavescens* (Blanchard)]
**Chrysopodes (Neosuarius) karinae* Freitas & Penny, 2001 [genus, subgenus not confirmed; *sedis incertae*]
Chrysopodes (Neosuarius) krugii (Kolbe, 1888) [good species in subgenus *Neosuarius*; previously considered a synonym of *C. (N.) collaris*]. **Reversal of previous synonymy; new status, new combination.**
Chrysopodes (Neosuarius) nigricubitus Tauber & Tauber 2010 [good species in subgenus *Neosuarius*]
Chrysopodes (Neosuarius) nigripilosus (Banks, 1924) [good species in subgenus *Neosuarius*]
Chrysopodes (Neosuarius) nosinus (Navás, 1913) [**New synonym** of *C. (N.) flavescens* (Blanchard)]
Chrysopodes (Neosuarius) oswaldi Penny, 2002 [good species in subgenus *Neosuarius*]
Chrysopodes (Neosuarius) pecki Tauber & Tauber, 2010 [good species in subgenus *Neosuarius*]
**Chrysopodes (Neosuarius) placitus* (Banks, 1908) [good species; genus, subgenus, *sedis incertae*].
Chrysopodes (Neosuarius) porterinus (Navás, 1910) [good species in subgenus *Neosuarius*]
**Chrysopodes (Neosuarius) poujadei* (Navas, 1910) [good species; genus, subgenus, *incertae sedis)*].
Chrysopodes (Neosuarius) tristellus (Navás, 1920) [**New synonym** of *C. (N.) porterinus* (Navás)]
Chrysopodes (Neosuarius) verticalis (Navás, 1929) [previously synonymized with *C. (N.) figuralis* (Banks, 1915)].

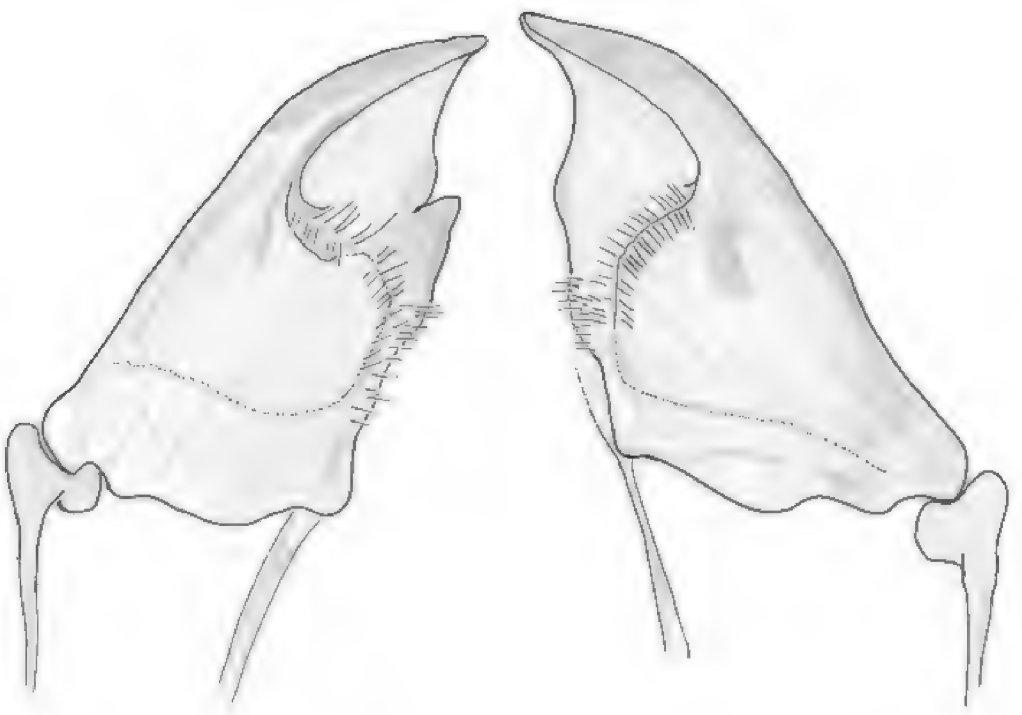

Figure 10. Typical mandibles of *Chrysopodes* (*Neosuarius*) adult (dorsal view).

10); (iv) body very waxy; (v) vertex relatively smooth (without pits, fields of small folds, or invaginated folds); (vi) frons prominent, smooth; (vii) forewing height not expanded (L:W ratio = 2.8–3.4; width at midpoint maintained within 7% from the first through the third quad of the wing; apex broad, rounded); (viii) forewing with anterior margin relatively straight; costal area unexpanded; height of tallest costal cell not more than 0.2× maximum width of wing, or 6.5× height of first costal veinlet; (ix) female with highly modified bursal duct [either elongate (*collaris* species-group) or fluted (*flavescens* species-group)].

The subgenus in now constituted as follows:

Chrysopodes* Navás 1913, subgenus *Neosuarius Adams and Penny, 1987 (1985)

collaris species-group

Chrysopodes (*Neosuarius*) *collaris* (Schneider, 1851)
Chrysopodes (*Neosuarius*) *figuralis* (Banks, 1915)
Chrysopodes (*Neosuarius*) *krugii* (Kolbe, 1888)
Chrysopodes (*Neosuarius*) *oswaldi* Penny, 2002

flavescens species-group

Chrysopodes (*Neosuarius*) *escomeli* (Navás, 1922)
Chrysopodes (*Neosuarius*) *flavescens* (Blanchard, 1851)
Chrysopodes (*Neosuarius*) *nigricubitus* Tauber and Tauber, 2010
Chrysopodes (*Neosuarius*) *nigripilosus* (Banks, 1924)
Chrysopodes (*Neosuarius*) *pecki* Tauber and Tauber, 2010
Chrysopodes (*Neosuarius*) *porterinus* (Navás, 1910)

Key to Species in *Chrysopodes* subgenus *Neosuarius*

For ease in identification, the key emphasizes external characters. However, to confirm species identity in most cases, it is essential to clear and examine the genitalia.

Thus, features from both the male and female genitalia are included in each couplet where appropriate.

1. Dorsum of body green, usually with yellow median stripe; head yellowish, sometimes with red or reddish brown markings [Faded specimens are cream-colored to tan, and the median stripe may not be obvious.]; frons without pair of brown spots below toruli (Fig. 12); male: terminal segments of abdomen without sclerotized transverse bands or sclerotized invagination on midline of S8+9 (e.g., Fig. 16); female with stout, funnel-shaped spermatheca; bursal duct elongate, usually slender (e.g., Fig. 26) ..... ***collaris* species-group (2)**

– Dorsum of body and head cream colored or tan, with brown markings; frons with pair of brown marks below toruli (Fig. 41); male: terminal segments of abdomen with sclerotized, transverse bands and sometimes sclerotized invagination on midline of S8+9 (e.g., Fig. 43); female with robust, tubular spermatheca; bursal duct fluted (e.g., Fig. 48)..... ***flavescens* species-group (5)**

2. Dorsal surface of scapes with pair of longitudinal mesal stripes (Fig. 11d); vertex with dark red V-shaped mark along anterior margin; fronto-clypeal suture without red markings (Fig. 12d); male and female: genitalia as in Figs 37–39 ..... ***oswaldi***

– Dorsal surface of scapes without stripes (Figs 11a–c); vertex, fronto-clypeal suture with or without reddish marks (Figs 12a–c); male and female: genitalia not as in Figs 37–39..... **3**

3. Face with crescent-shaped or transverse, red or reddish brown markings on frons below antennal sockets (toruli) and usually with transverse reddish band at base of clypeus (Figs 12a, 12b); prothorax without pair of reddish sublateral stripes (Figs 11a, 11b); male and female: genitalia not as in Figs 31–35 ..... **4**

– Face without markings on frons or clypeus (Fig. 12c); prothorax usually with pair of red longitudinal, sublateral stripes (Fig. 11c); male and female: genitalia as in Figs 31–35 ..... ***krugii***

4. Vertex either without reddish marks or with light red to red stripes; prothorax with yellow mesal stripe (Fig. 11a); male: apodeme of T9+ectoproct robust, extending beyond callus cerci, with pronounced ventral and caudal arms (Fig. 16), mediuncus with dorsal rods arising from below the gonarcal bridge (Figs 16, 17a); female: bursal duct very long and narrow (greatly exceeding twice the length of the abdomen) (Figs 19, 20) ..... ***collaris***

– Vertex with pair of broad, reddish brown or brown marks; prothorax entirely green or green with brown mesal stripe, without yellow mesal stripe (Fig. 11b); male: apodeme of T9+ectoproct slender, terminating at callus cerci, without ventral or caudal projections (Fig. 23), mediuncus with rods arising from frontal surface of gonarcal bridge (Fig. 24b); female: bursal duct not especially narrow or long (~ the length of abdomen or shorter) (Figs 26, 27).... ***figuralis***

5. Dorsal surface of vertex with distinct brown or reddish marks; prothorax with pronounced jagged, longitudinal stripes mesally and sublaterally (Figs 40a, b, f); wing length 13.9–16.7 mm; male: without large, eversible membranes on S8+9 or setose ducts on gonosaccus; mainland South America **6**

– Dorsal surface of vertex largely unmarked except for brown stripe along anterior margin (Figs 40c–e); pronotum with light brown marks, not forming pronounced longitudinal stripes; wing length 10.2–13.7 mm; male: with large, eversible pouches above the tip of S8+9 and thin, elongate, setose ducts originating within the gonosaccus (below mediuncus) (Figs 58b); Galápagos Islands..... **8**

6. Basal segments of flagellum dark brown to black; scape with one or no stripes (Figs 40b, f); crossveins of forewing green or brown, not marked with white; male genitalia as in Figs 52, 68; female genitalia as in Figs 48b, c..... 7

– Basal segments of flagellum cream-colored; scape with two longitudinal stripes (one mesal on dorsal surface, one mesolaterally) (Fig. 40a); crossveins of forewing prominently white in center, brown to dark brown at base and tips; male and female: genitalia as in Figs 43–47, 48a..... ***escomeli***

7. Longitudinal veins and crossveins of forewings mostly cream-colored, with light brown markings only at junctions; male: genitalia as in Figs 51–52; female with tip of subgenitale rounded, knob-like, extending perpendicularly to base (Fig. 48b) ..... ***flavescens***

– Longitudinal veins of forewings cream-colored and extensively marked with dark brown to black, crossveins mostly dark brown throughout; male: genitalia as in Figs 67–68; female with tip of subgenitale elongate, flat, angled inward, toward base (Figs 48c, 71) ..... ***porterinus***

8. Forewing with extensive, dark brown suffusion around many crossveins (Fig. 56); male: gonarcal arms flared outward, away from mediuncus (Fig. 58); female: sternites without brown marks (Fig. 57c) .... ***nigricubitus***

– Forewing without dark brown suffusion on membrane (Figs 60, 63); male: gonarcal arms directed inward next to mediuncus (e.g., Figs 61a, b); female: sternites S5, S6 and/or S7 with brown markings (Figs 57b, d) **9**

9. Small size, wing length not exceeding 13 mm; pronotum approximately equal in length and width; vertex without brown spots behind (Fig. 40d); second intracubital crossvein not bent or swollen (Fig. 60); male: horizontal apodeme on venter of T9+ectoproct arched mesally, with rounded, forked tip (Figs 64a, c); female: S5, S6 and S7 (at least basally) marked with brown (Fig. 57b)..... ***nigripilosus***

– Large size, wing length greater than 13 mm; pronotum longer than wide; vertex with pair of posterolateral brown spots (Fig. 40e); second intracubital crossvein slightly bent, with dark brown swelling mesally (Fig. 63); male: horizontal apodeme on venter of T9+ectoproct straight, with acute, unforked tip (Figs 64b, d); female: S5 dark brown, S6 partially brown basally (at least basally), S7 cream-colored (Fig. 57d) ..... ***pecki***

Chrysopodes (Neosuarius) – *collaris* species-group

Four *Chrysopodes* (*Neosuarius*) species from Mexico, Central America, the Caribbean region, and South America (south to northern Chile) form a natural group (the *collaris* species-group); they share the following characteristics:

1 Body (dorsal): primary color green, usually with yellow mesal stripe
2 Head: yellowish with red or reddish markings
3 Male: eversible pouch at tip of S8+9 composed of heavy membrane bearing large field of robust gonocristae
4 Male: abdomen without transverse sclerotized, transverse bands on T9+ectoproct or sclerotized invagination along midline of S8+9
5 Female: spermatheca funnel-shaped, opening apically to bursa copulatrix via an elongate bursal duct
6 Female: spermathecal duct relatively well sclerotized, long, slender
7 Female: bursal duct tubular, extending from tip of bursa copulatrix, thickened, about twice length of bursa copulatrix [*C.* (*N.*) *figuralis*] or slender, elongate, longer than the length of the abdomen [*C.* (*N.*) *collaris, C.* (*N.*) *krugii, C.* (*N.*) *oswaldi*]
8 Female: bursal glands not known to have accessory ducts

Chrysopodes (Neosuarius) collaris (Schneider, 1851)

Figs 11a, 12a, 13–20

Chrysopa collaris Schneider, 1851: 80 [ZMB, Holotype (by monotypy): "Indiae occidentalis insula St. Thomae; unum tantum exemplar defectum …"]. Walker 1853: 245 [brief redescription]; Hagen 1861: 218 [brief redescription]; Kolbe 1888: 173 [species list]; Navás 1913–1914: 86 [species list]; Penny 1977: 17 [species list].

Chrysopa thoracica Walker, 1853: 243 [BMNH, Lectotype (by present designation): "St. Domingo"]. Hagen 1861: 218 [brief redescription]; McLachlan1868: 269 [taxonomic note]; Kolbe 1888: 173 [species list]; Navás 1925a: 86 [locality]; Navás 1925b: 8 [locality]; Smith 1931: 807 [redescription of adult, figure of larva, biology]; Banks 1938: 121 [taxonomic notes]; Alayo 1968: 41 [redescription]; Penny 1977: 21 [species list]; Adams and Penny 1985 [1987]: 436 [synonymy]; Penny et al. 1997: 53 [information on type, distribution]; Oswald 2007 [catalog listing, as a synonym of *C.* (*N.*) *collaris*].

Chrysopa krugii Kolbe, 1888: 173 [ZMB, Lectotype (by present designation): no locality data]. Penny 1977: 21 [species list]; Adams and Penny 1985 [1987]: 436 [synonymy]; Penny et al. 1997: 53 [information on type, distribution]; Oswald 2007 [catalog listing, as a synonym of *C.* (*N.*) *collaris*]. Herein, removed from synonymy and recognized as a distinct biological species (**New Status**).

Chrysopa signatalis Banks, 1911: 342 [USNM, Holotype (by original designation): "Brownsville, Texas"]. Penny 1977: 21 [species list]; Adams and Penny 1985 [1987]: 436 [synonymy]; Penny et al. 1997: 53 [information on type, distribu-

tion]; Flint 2002: 93 [type deposition]; Oswald 2007 [catalog listing, as a synonym of *C.* (*N.*) *collaris*].

Chrysopa rufolinea Banks, 1914: 24 [MCZ, Lectotype (by present designation): "Cali Colombia, 1000 m"]. Penny 1977: 21 [species list]; Banks 1944: 12 [locality record]; Adams and Penny 1985 [1987]: 436 [synonymy]; Penny et al. 1997: 53 [information on type, distribution]; Oswald 2007 [catalog listing, as a synonym of *C.* (*N.*) *collaris*].

Chrysopa thoracica cerverina Navás, 1922a: 171 [MCZ, Lectotype (by present designation): "Cuba: Havane"]. Navás 1925a: 8 [locality record]; Alayo 1968: 41 [redescription]; Penny 1977: 21 [species list]; Adams and Penny 1985 [1987]: 436 [synonymy; date of species description given as 1923]; Oswald 2007 [catalog listing, as a synonym of *C.* (*N.*) *collaris*].

Chrysopa dampfina Navás, 1927 [1928]: 324 [MNHN, Lectotype (by previous designation): "Rio Belice, cerca de Belice, Honduras Británicas, en follaje de mangles, 6 de Septiembre de 1925"]. Penny 1977: 17 [species list]; Brooks and Barnard 1990: 279 [listed as *'Chrysopa' incertae sedis*]; Legrand et al. 2008 [2009]: 127 [lectotype designation; synonymy with *C.* (*Neosuarius*) *figuralis*]; Oswald 2007 [catalog listing]; (**New Synonymy**).

Chrysopa acolhua Banks, 1948 [1949]: 156 [MCZ, Holotype (by original designation): "Pungarabato, Guerrero, Mexico"]. Adams and Penny 1985 [1987]: 436 [synonymy]; Penny et al. 1997: 53 [information on type, distribution]; Oswald 2007 [catalog listing, as a synonym of *C.* (*N.*) *collaris*].

Chrysopodes (*Neosuarius*) *collaris* (Schneider). Adams and Penny 1985 [1987]: 436 [species transferred to *Chrysopodes* (*Neosuarius*), synonymies, redescription, illustrations]; Adams and Penny 1986: 121 [illustrations, distribution]; Brooks and Barnard 1990: 213, 272 [species list, illustrations]; Henry et al. 1992: 453 [distribution]; Penny et al. 1997: 53 [information on type, taxonomy, distribution in USA]; Penny 2002: 222, 362 [diagnosis, notes, illustrations]; Eisner and Silberglied 1988: 15 [larval prey association]; Oswald et al. 2002: 578 [checklist of Mexican species]; Tauber 2003: 472 [redescription (adult), description (larvae), biology]; Valencia Luna et al. 2006: 27 [species list (Morelos, Mexico)]; Oswald 2007 [catalog listing, nomenclature].

Diagnosis. Externally, *Chrysopodes* (*N.*) *collaris* adults are recognized by a robust, green body, bright yellow, median dorsal stripe, and distinctive red to pink head markings (Figs 11a, 12a,13, 14). Well-marked individuals have oblique marks along the upper border of the antennal sockets, stripes along the margins of the eyes, crescent-shaped marks below the antennae, a transverse band across the fronto-clypeal suture, lateral marks on the clypeus, and broad genal stripes. The longitudinal venation of the forewings is mostly green, but the crossveins are usually brown, at least in part.

In the male, the gonarcus is arcuate; the arms and bridge are broad and well sclerotized. The paired dorsal rods of the mediuncus arise from beneath the gonarcal bridge. The mediuncus terminates in a microsetose, hook-shaped apical beak (Fig. 17). The

Figure 11. *Chrysopodes* (*Neosuarius*) *collaris*-group: Head, prothorax, dorsum. **(a)** *C.* (*N.*) *collaris* **(b)** *C.* (*N.*) *figuralis* **(c)** *C.* (*N.*) *krugii* **(d)** *C.* (*N.*) *oswaldi* (probably faded).

female terminalia are typified by a relatively wide, funnel-shaped spermatheca with a broad invagination and an elongate, loosely curved velum, the terminus of which attaches to the bursal duct (Fig. 20). The spermathecal duct is relatively long, well sclerotized, and coiled. The most distinguishing characteristic of the females is the extraordinarily long bursal duct, most of which is ribbon-like and coiled (Figs 19, 20); it is at least longer than twice the length of the body. The subgenitale has a short neck (Fig. 18) and is rounded apically (Fig. 20).

Description. *Head* (Figs 11a, 12a, 13,14): Width (frontal, including eyes) 1.4–1.7 mm; ratio, head : eye width = 2.0–2.7:1; distance (straight-line) between tentorial pits 0.48–56 mm. Distance between antennae ~0.08–0.13 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.44–0.48 mm; length of clypeus ~0.28–0.32 mm long. Antenna ~1.1× length of forewing (11.1–12.9 mm). Vertex raised slightly, rounded throughout, truncate posteriorly; surface smooth, very small sculpturing on posterior margin, shiny throughout, without setae. Frons relatively flat, unsculptured; surface smooth, shiny throughout. Clypeus unsculptured; surface smooth; distal mar-

Figure 12. *Chrysopodes* (*Neosuarius*) *collaris*-group: Head, frontal. **(a)** *C.* (*N.*) *collaris* **(b)** *C.* (*N.*) *figuralis* **(c)** *C.* (*N.*) *krugii* **(d)** *C.* (*N.*) *oswaldi*.

gin straight; anterior margin with row of small setae. Labrum flat; surface smooth; distal margin setose, indented mesally.

Head coloration: Head yellow, with red markings of variable size and depth, ranging from absent to patches of deep red along eyes, extending on frons below antennae as crescent-shaped stipes; gena, lateral margin of clypeus red (see Fig. 14 for range of color variation). Antenna yellow, with amber colored setae. Maxillary palp with distal, penultimate, middle segments amber, with or without lateral brown marks; basal two segments pale. Labial palp pale to amber. Venter cream, unmarked.

Thorax (Figs 11a, 13): Pronotum 1.3–2.0× wider than long: ~0.68–1.02 mm long; ~1.03–1.50 mm wide; light green, with broad, mesal, yellow stripe; lateral margins with numerous long, pale setae (longest 0.2–0.3 mm long). Meso-, metanota light green, with yellow mesal stripe, short setae. Pleural areas pale green, without markings. Legs pale green, without markings; tarsi amber. Tarsal claws dark amber, recurved with deep cleft, quadrate base.

Wings (Fig. 15): Forewing 10.9–14.3 mm long, 3.4–4.5 mm wide, L:W ratio, 3.1–3.2 : 1. Costal margin slightly rounded to straight; apex broad, with very slight angle. Costal area not enlarged; height of tallest costal cell (#6, 7) = 3.2–4.5× length of first costal veinlet, 0.16–0.20× width of wing. Subcosta, radius sinuate; most subcostal veinlets, radial crossveins straight. Eleven to twelve closed radial cells (between R and Rs), height of tallest radial cell 1.4–1.8× width; other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four to five b' cells. First intramedian cell ovate,

Figure 13. *Chrysopodes* (*Neosuarius*) *collaris*: Variation in head and thoracic coloration: **(a)** USA: Florida **(b)** West Indies: Dominican Republic **(c)** Mexico, Jalisco **(d)** West Indies: British Virgin Islands.

0.6–0.9× width of third medial cell; inner row of four to six gradate veins; seven to nine outer gradate veins; both rows regularly stepped, parallel to each other throughout. Second cell beneath Rs with i.g. at base = 1.3–1.9 mm tall, 3.1–3.6× width; third cell = 1.1–1.9 mm tall, 2.7–3.9× width. Second gradate cell 1.1–1.4 mm tall, 2.2–3.4× width; third gradate cell 0.9–1.3 mm tall, 2.1–3.3× width. Length of second cell beneath Rs with i.g. at base = 1.2–1.6× length of second gradate cell. Three intracubital cells; distal one open, icu1, icu2 each shorter than icu3; icu1, icu2 similar in length. Vein 1A forked. Hindwing narrow, with somewhat acute apex; 9.7–12.9 mm long, 2.9–3.9 mm wide. Ten to twelve radial crossveins; three to five inner gradates; six to eight outer gradate veins; three b cells, plus small t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline, with stigma transparent to slightly opaque. Longitudinal veins green; costal veinlets, crossveins variable from green to marked with brown at bases and tips, to brown throughout; inner gradates usually brown; outer gradates variable; outer gradates of hindwing usually green.

Abdomen (Figs 16, 18): Dorsum light green, with yellow mesal stripe, no other markings; venter cream colored; callus cerci light green. Tergites 6, 7: roughly quadrate, with convex ventral margins; length ~1.7–2.6 times greater than height (lateral view, excluding extension on ♂); with medium-length, slender setae. Pleural regions P6, P7 with slightly shorter setae. Sternite 6: quadrate, with dorsal margins relatively straight; length ~0.8× height (lateral view); with medium-length, slender setae. Spiracles oval, not enlarged, ~0.05–0.07 mm diameter; atria not enlarged.

Figure 14. *Chrysopodes* (*Neosuarius*) *collaris*: Variation in facial coloration: **(a)** USA: Florida **(b)** Mexico: Sinaloa **(c–e)** Mexico: Baja **(f)** Mexico: Jalisco **(g–h)** West Indies: Dominican Republic.

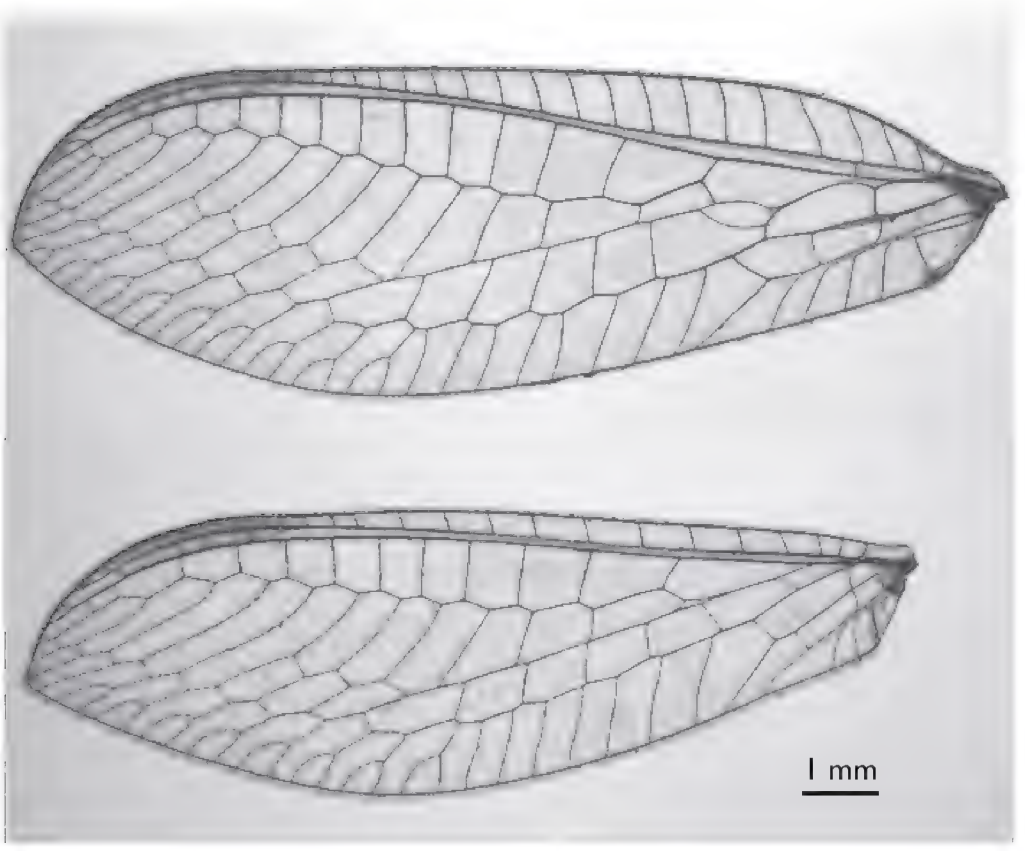

Figure 15. *Chrysopodes* (*Neosuarius*) *collaris*: Forewing, hindwing (Mexico: Baja California Sur).

Male (Figs 16, 17): T8 quadrate (lateral view), ventral extension very lightly sclerotized, with setae. T9+ectoproct fused dorsally, without suture or distal invagination; terminal edge straight vertically, bearing vertical field of dense, long, robust setae; ventral apodeme heavy, thick, rounded anteriorly, with two sharp ventral arms (anterior one variable in size, bending slightly inward; terminal one extending posteriorly around tip of ectoproct, then ventrally), with dorsal process extending around callus cerci (heavy anteriorly, less so posteriorly). Callus cerci oblong (0.27 mm tall, 0.14–0.16 mm wide), with 40–44 trichobothria. S8+9: length ~1.5× proximal height, ~2.5× mesal height, ~10× distal height; ventral margin straight, without midline knob or apodeme; terminus upturned, rounded, with distal margin bearing dense patch of robust setae with slightly enlarged bases; terminus with eversible membranous pouch or fold, basal part of membrane with large patch of gonocristae. Subanal plate distinct, well sclerotized, with dense, robust setae. Gonarcus arcuate, loosely attached to T9+ectoproct dorsally via long, folded subanal membrane. Gonarcal bridge broad, flat (ventral view); lateral apodemes extending from distal margins of bridge, not greatly flared distally; span of gonarcal bridge ~0.35 mm, span between gonarcal apodemes distally ~0.5 mm. Gonarcal apodemes smooth, scalloped, rounded distally (dorsal view), roughly quadrate (lateral view). Mediuncus broad basally, with pair of robust rods extending from below gonarcal bridge, upward and outward, tapering. curving distally; dorsum rounded, distal end bent into ventrally projecting beak; dorsal surface with dense covering of microsetae; membrane below mediuncus flat, straight, with 4 to 5 very small gonosetae. Gonosaccus large, delicate, without gonosetae or much structure. Hypandrium internum broad, rounded anteriorly, with slender, elongate, curved comes.

Female (Figs 18–20): Tergite 8: depth of fully sclerotized portion less that one-half length of sclerite; depth of less sclerotized ventral extension more than length of

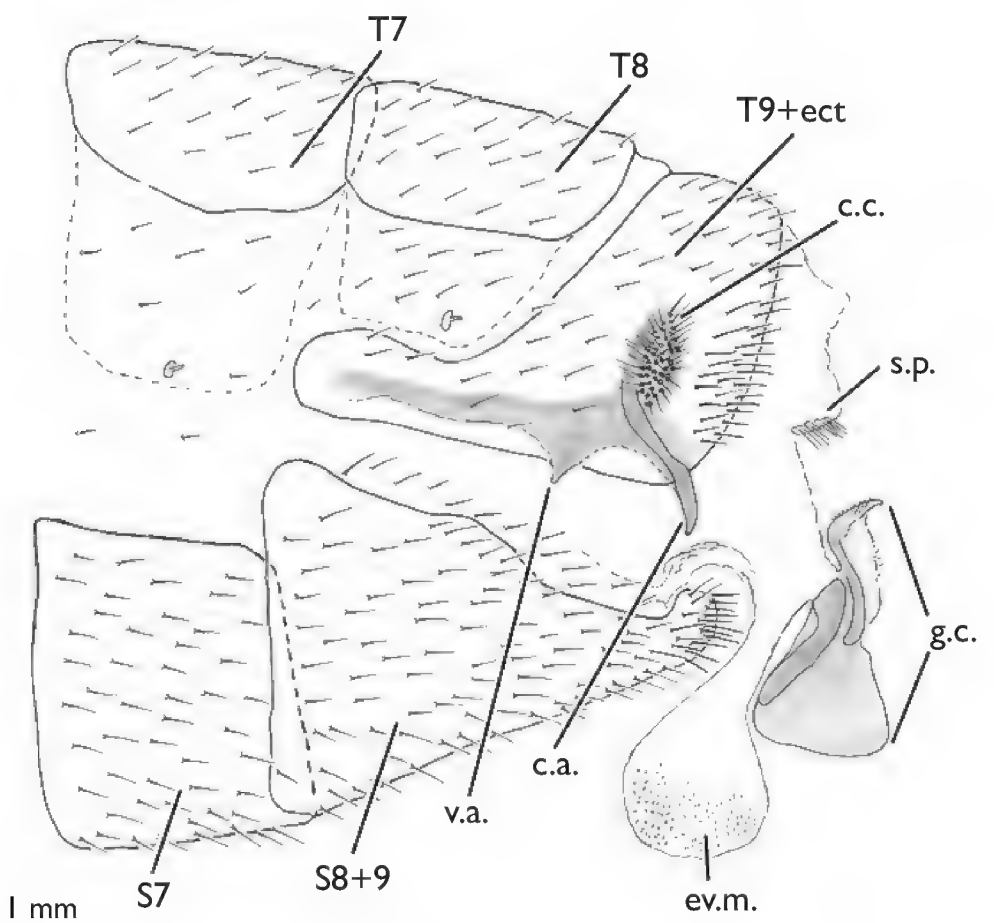

Figure 16. *Chrysopodes* (*Neosuarius*) *collaris*: Male terminus, lateral (anal region, gonarcal complex, membrane at tip of S8+9 everted). **c.a.** caudal arm of apodeme on T9+ectoproct **c.c.** callus cerci **ev.m.** eversible membrane **g.c.** gonarcal complex **s.p.** setose subrectal plate **S7** seventh sternite **S8+9** fused eighth and ninth sternites **T7** seventh tergite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct **v.a.** ventrally projecting arm of apodeme on T9+ectoproct.

sclerite, with fairly long, slender setae. Ninth tergite + ectoproct (lateral view) tilted, ventral margin extending ~1/2 way beneath T8; proximal margin straight throughout or slightly concave; distal margin extending well below lateral margin of gonapophyses laterales. Callus cerci very slightly taller than broad (0.11–0.17 mm tall, 0.10–0.14 mm wide), with approximately 30–32 trichobothria. Gonapophyses laterales 1/4th to 1/2 height of T9+ectoproct, slender, approximately 3.1–3.2 times taller than wide, rounded dorsally, ventrally, orientated posteroventrally (~50–60° angle from midline), with robust setae. Seventh sternite (lateral view): length ~1.6–1.7× height of proximal margin; dorsal margin sloping gently throughout; distal margin somewhat concave; with long, slender setae. Subgenitale broad, dome-like, without neck, with very small ventrally projecting process; base smooth, thick membrane, attached to S7 via leathery, folded, invaginated membrane. Pair of large, bulbous bursal glands with elongate, narrow ducts opening dorsolaterally on posterolateral margin of bursa, without accessory ducts. Bursa extending laterally full width of segment, posteriorly usually beyond spermatheca; dorsal surface leathery, with numerous, small, transverse folds, folds with rounded edges. Bursal duct extremely long (longer that 2× length of abdomen); section arising from bursa coiled, flat, ribbon-like, surface with small transverse folds; section arising from spermatheca round, curved, tubular, with smooth surface. Spermatheca funnel-shaped,

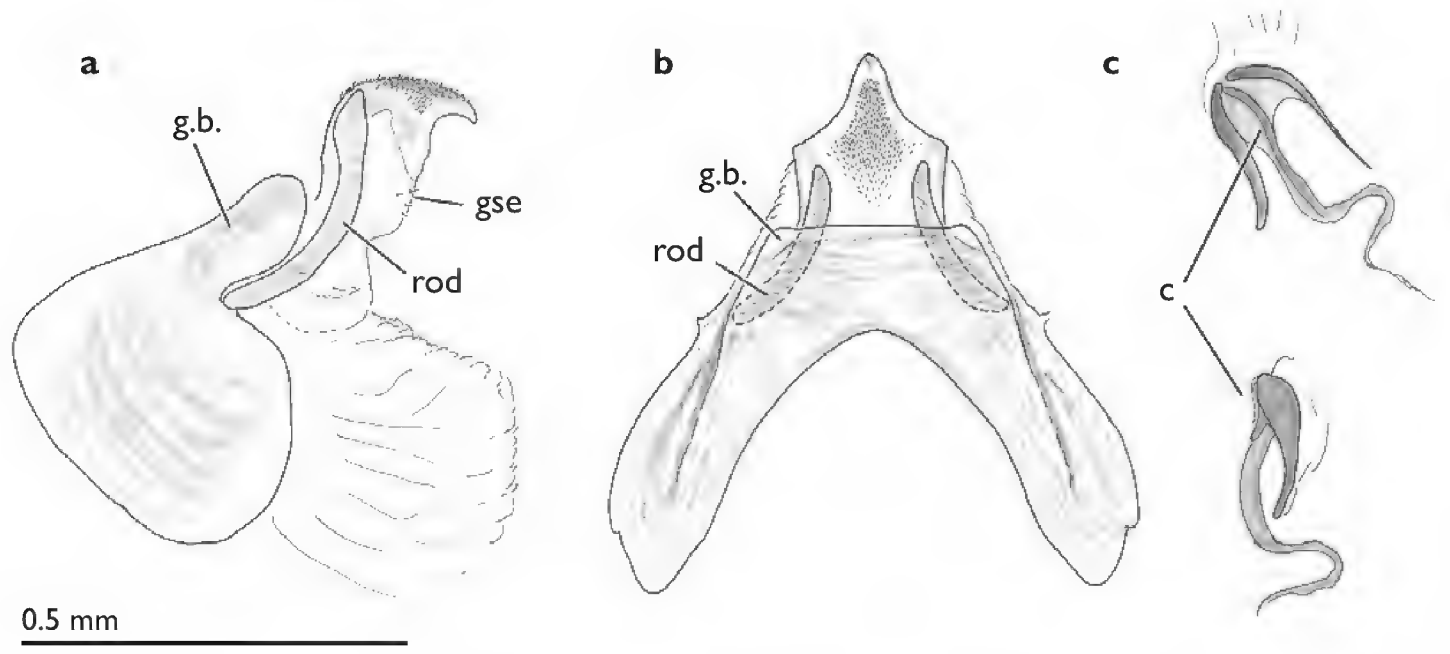

Figure 17. *Chrysopodes* (*Neosuarius*) *collaris*: Male genitalia. **(a)** gonarcus, lateral (gonosaccus everted) **(b)** gonarcus, dorsal (gonosaccus not shown) **(c)** hypandrium internum, dorsal view (above), lateral view (below). All images to scale shown. **c** combes **g.b.** gonarcal bridge **gse** gonosetae **rod** internal sclerotized rod of mediuncus.

with large, mesal velum that bends several times, tapers into bursal duct; ~0.59–0.65 mm diameter, 0.60–0.65 mm in length to first bend; invagination elongate, tapered, extending through first sharp bend, at least part way through next section (total length ~1.1–1.3 mm). Spermathecal duct ~4 mm long, narrow, arising from posterior surface of spermatheca slightly on left side, with U-shaped curve within subgenitale; basal 1/3rd sclerotized, brownish; distal 2/3rd, brushy, very pale (only visible under compound microscope), becoming enlarged distally. Colleterial gland elongate, narrow, extending into seventh segment, with slightly grainy texture; no reservoir or accessory glands found. Transverse sclerotization well-formed, curved, ellipsoid plate, located ventrally within gonapophyses laterales, with longitudinal (to the body) rows of setae; membrane internal to transverse sclerotization with several rows of short, sparse setae.

Larvae. Illustrated by Smith (1931), described by Tauber (2003).

Eggs. Ovoid, stalked, laid singly without a discernible pattern; stalk with oily droplets; stalk length 3.2 – 3.9 mm (Tauber 2003).

Biology. Adults of C. (N.) collaris were collected in all months throughout its range. Most collections of *C.* (*N.*) *collaris* have been made at light in coastal areas. Adults have also been collected on sandy beaches, in mangroves and coccoloba forests, on salt scrub, and frequently in horticultural settings, e.g., on *Citrus*, *Hibiscus*, *Eugenia*, bamboo (Smith 1931, Eisner and Silberglied 1988). Other specimens were taken from disturbed forests and rainforests, up to 1275 meters. One collection was from a bat-inhabited cave.

Larvae on *Eugenia* in Florida were associated with colonies of mealybugs (*Plotococcus eugeniae* Miller and Denno) that produce white, waxy coverings (Eisner and Silberglied 1988). Presumably, the *C.* (*N.*) *collaris* larvae transfer wax from the mealybugs to their dorsa.

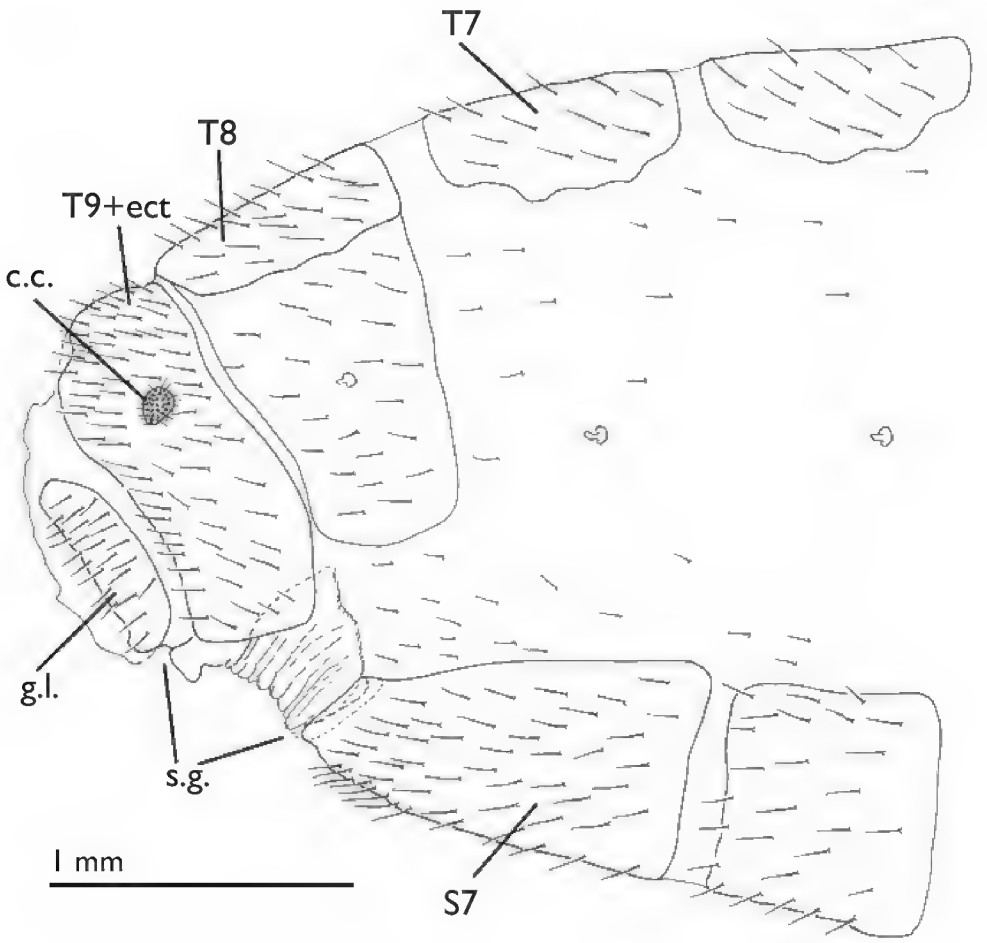

Figure 18. *Chrysopodes* (*Neosuarius*) *collaris*: Female terminus, exterior, lateral. **c.c.** callus cerci **g.l.** gonapophysis lateralis **sg** subgenitale **S7** seventh sternite **T7** seventh tergite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct. Setose subrectal plate not shown.

Developmental rates appear to be variable. In rearings at ~21°C (LD 16:8, aphid prey), the egg stage was 7–10 d, the first instar was 9–10 d, the second instar 7–10 d, the third instar ~14 d; no diapause was observed (Tauber 2003). In other rearings (conditions unspecified, but probably > 21°C): the egg stage was 4 d, the larval stage 14 d, and the period within cocoon 11 d (Smith 1931).

It is thought that this species could be useful in the biological control of insect pests, especially in orchards or ornamental plantings (e.g., Adams and Penny 1985).

Type material. ***Chrysopa collaris*** **Schneider.** Schneider (1851) specified that there was one type specimen. According to Adams' notes and M. Ohl (personal communication, 2008), there are five specimens of *C. collaris* in the ZMB with the same accession number "337". However, only one has locality data that is exactly as reported in Schneider's original description and that also has its wings spread and its abdomen missing – conditions that correspond to the original description [specimen examined]. Adams labeled this specimen as the type in 1977; it is here identified as the Holotype (by monotypy). Its labels read: (1) "St. Thom, Puerto Rico, Moritz" [green, hand-written]; (2) "collaris Schn.*" [white, hand-written]; (3) "Type" [red, printed]; (4) "337" [white]; (5) "This is the type. Schneider says one specimen without abdomen. Adams 1977" [white, hand-printed, Adams]; (4) "HOLOTYPE *Chrysopa collaris* Schneider, 1851; det. C. A. Tauber '09" [red].

Chrysopa thoracica **Walker.** The type is in the BMNH; according to D. Goodger (BMNH), it is missing its abdomen. Walker (1853) did not mention how many speci-

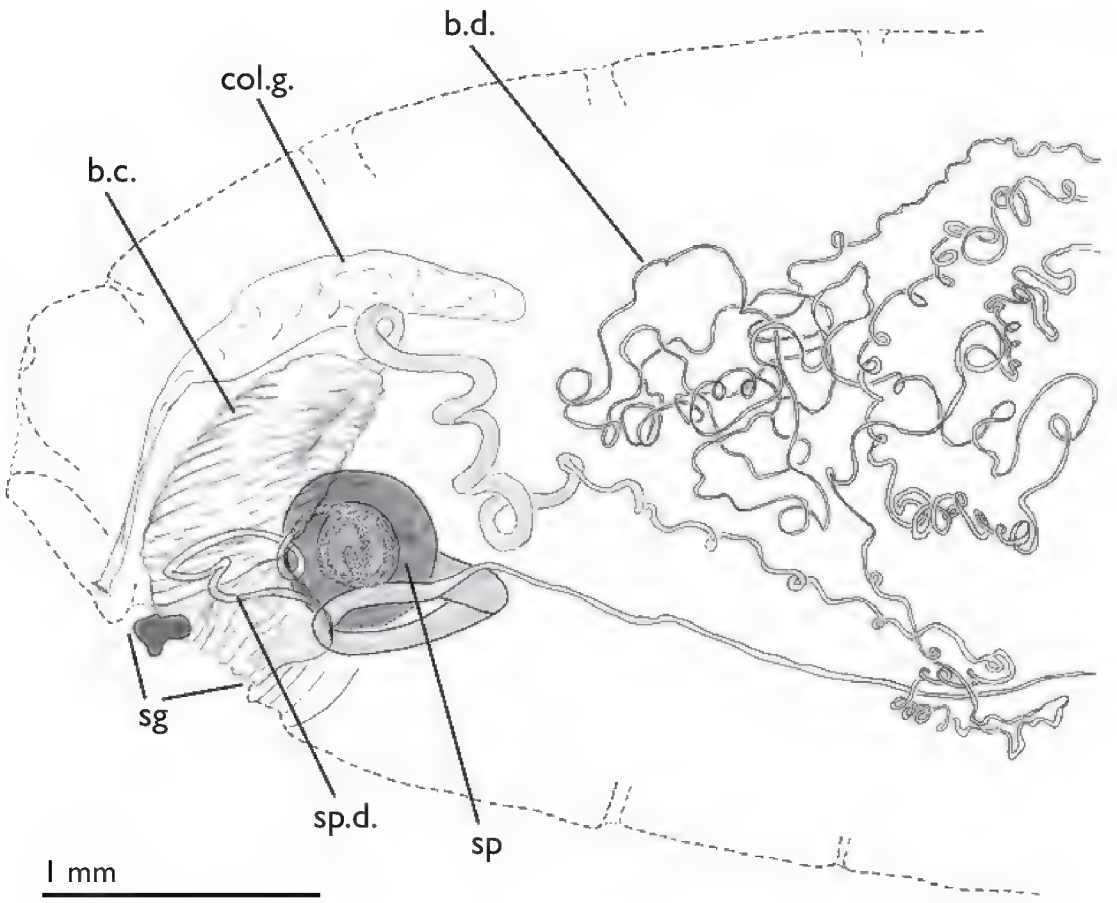

Figure 19. *Chrysopodes* (*Neosuarius*) *collaris*: Female terminus, interior, lateral. **b.c.** bursa copulatrix **b.d.** bursal duct **col.g.** colleterial gland **sp** spermatheca **sp.d.** spermathecal duct. Bursal glands not shown.

mens he had when he prepared the description; thus this type should be considered the Lectotype (present designation). Its labels read: (1) "San Domingo" [upper surface], "45/60" [lower surface; British Museum registration number 1845–60]; (2) "thoracica"; (3) "LECTOTYPE *Chrysopa thoracica* Walker, 1853; des. C. Tauber 2009" [red].

Because the abdomen is missing and the specimen lacks head markings, it is not possible to identify this specimen for certain. However, it is not likely to be an example of *C.* (*N.*) *krugii* for several reasons: (1) Walker mentioned that the wings had many dark "veinlets" – a characteristic that is more typical of *C.* (*N.*) *collaris* than *C.* (*N.*) *krugii*. (2) The prothorax does not have the red markings on the prothorax that are characteristic of *C.* (*N.*) *krugii*, nor does Walker mention any. Thus, the prothorax is more typical of *C.* (*N.*) *collaris* than *C.* (*N.*) *krugii*. (3) Walker's (1853) original description did not refer to the red head markings that distinguish *C.* (*N.*) *collaris* specimens externally; indeed, McLachlan (1868: 269) stated that markings lateral to the antennae were lacking on the type specimen at the time he examined it. However, the population of *C.* (*N.*) *collaris* from Santo Domingo exhibits great variation in its head markings, and many specimens lack them altogether. (4) Finally, *C.* (*N.*) *krugii* currently is not known from Santo Domingo. Thus, I retain Adams' synonymy of *C. thoracica* under *C. collaris*.

***Chrysopa krugii* Kolbe.** See *Chrysopodes* (*N.*) *krugii* below.

***Chrysopa signatalis* Banks.** Syntypes of this species are reported from two collections – the USNM and the MCZ (see Penny et al. 1997: 53). Banks (1911: 342)

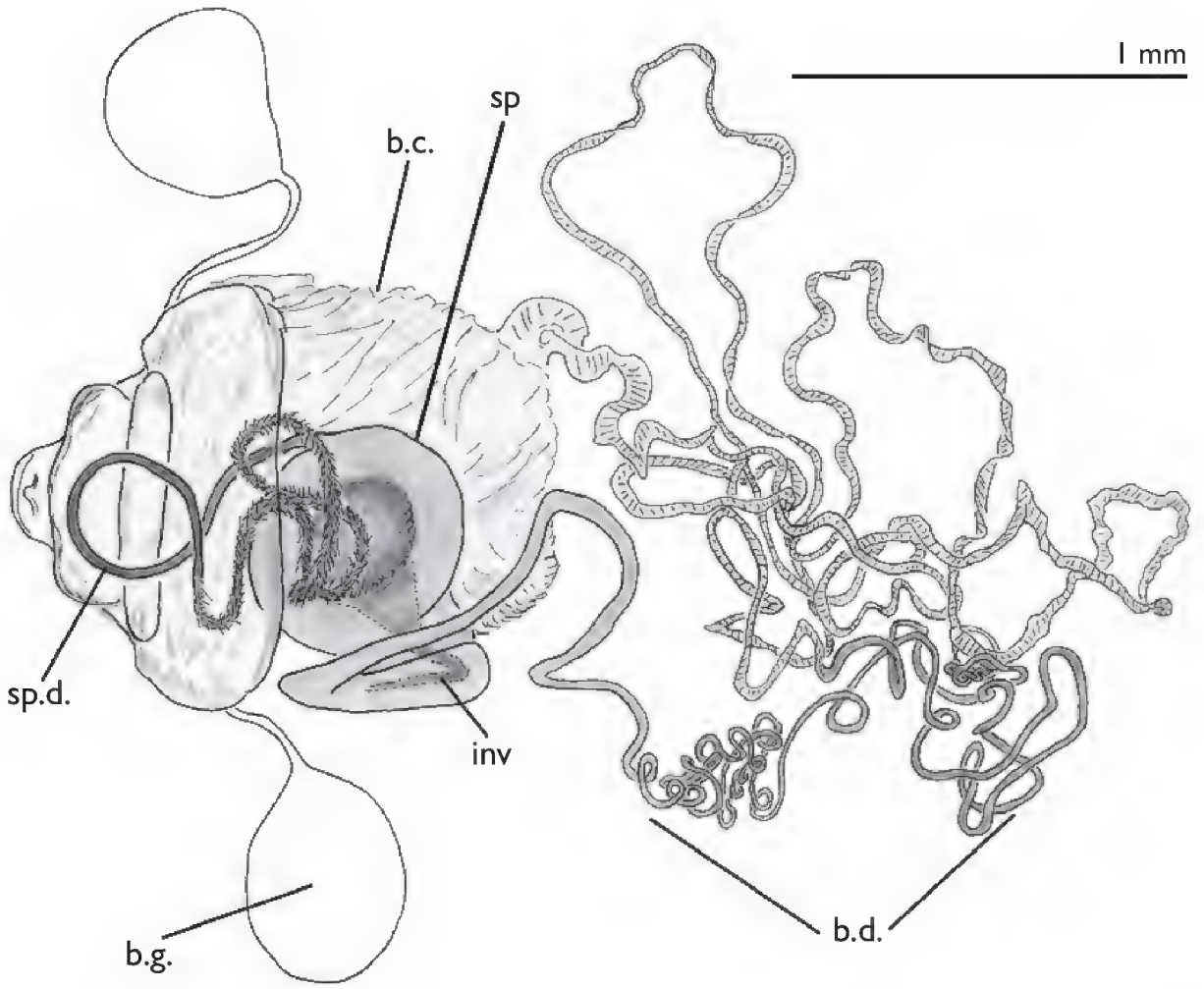

Figure 20. *Chrysopodes* (*Neosuarius*) *collaris*: Female genitalia, ventral. **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **inv** invagination **sp** spermatheca **sp.d.** spermathecal duct.

stated clearly that the "type" [singular] was in the Brooklyn Museum Institute and that the "cotype" [singular] was in his personal collection (now in the MCZ). The USNM acquired the Brooklyn collection, and thus the type (a female) that is in that collection is recognized as the Holotype (by original designation). O. S. Flint (personal communication) informed me that the specimen is in fairly good condition and facial markings that are typical of *C.* (*N.*) *collaris* are evident. The specimen's labels read: (1) "Brownsville Tex VI"; (2) "33"; (3) "Catal.No. 128"; (4) "Brooklyn Museum Colln. 1929"; (5) "Type No. 42778 U.S.N.M."; (6) "Chrysopa signatalis Bks. Type" [folded]; (7) "Chrysopa signatalis Banks"; (8) HOLOTYPE *Chrysopa signatalis* Banks 1911; det. C. Tauber '09" [red].

A paratype (a female, examined) is in the USNM; its label data are the same as those on the holotype, except: label (2) reads "34"; (5) reads "Paratype 42778"; (6, 7) are not present; and (8) reads "PARATYPE *Chrysopa signatalis* Banks 1911; det. C. A. Tauber '09" [yellow].

A third type, a female in the MCZ, is identified as a paratype. Images of this specimen are on the MCZ Type Database; the markings are those of *C.* (*N.*) *collaris*. Its labels read: (1) "Brownsville, VI Tex" [white]; (2) "Collection N. Banks" [white]; (3) "cotype" [red, handwritten]; (4) "Type 11390" [red]; (5) "Chrysopa signatalis Bks Cotype" [white, red border; hand-written, Banks]; (6) "Suarius collaris Schneider det. P. Adams'82" [white, hand-written, Adams]; (7) "PARATYPE *Chrysopa signatalis* Banks 1911; det. C. A. Tauber '09" [yellow].

***Chrysopa rufolinea* Banks.** Banks (1914: 24) did not mention type specimens in his original description; however, the publication dealt with material from his collection (now in the MCZ). Three specimens are in the MCZ collection. One (a male, examined) bears a "type" label in Banks' hand-writing, whereas the other two specimens bear "Paratype" labels. The former was considered the "holotype" by Penny et al. 1997: 53. Its label data read: (1) "Cali, Colombia / 1000 m" [white, hand-written]; (2) Fassl coll" [white, hand-written]; (3) "Collection N. Banks" [white, printed]; (4) "Type" [red, hand-written]; (5) "Chrysopa rufolinea Bks type" [white, red border, hand-written (Banks); (6) "Type 11992" [red, printed]; (7) "Chrysopa (Glenochrysa) collaris / ♂ Schneider det. P. Adams '74 [white, hand-printed (Adams)].

The other two specimens (examined, one female, one with abdomen missing) are *C. rufolinea* paralectotypes. Their label data are identical to the Holotype, except for the following: label (4) reads " rufolinea" [white, hand-written]; (5) is missing; (6) reads "M.C.Z. Paratype 11992" [red, printed]; (7) is missing; (8) reads "PARALECTOTYPE *Chrysopa rufolinea* Banks 1914; det. C. A. Tauber '09" [yellow, printed].

***Chrysopa thoracica cerverina* Navás.** Navás (1922a) did not specify how many specimens he used to describe the species; one type (a female, examined) is in the MCZ; I consider it to be the Lectotype (present designation). The specimen is in fairly good condition; its abdomen is present, but undissected. The facial markings are distinctive. Its labels read: (1) "Tropical / 3.VIII.1822 / C: Cervera" [white, hand-printed]; (2) "Chrysopa / thoracica Walk. / v. cerverina Nav. / P. Navás S. J. det." [white, hand-printed (Navás) and printed]; (3) "Typus" [pink, hand-printed, probably Navás]; (4) "Type 15111" [red, printed]; (5) "LECTOTYPE *Chrysopa thoracica* Walk. var. *cerverina* Navás 1923; des. C. A. Tauber '09" [red]; (6) *Chrysopodes* (*Neosuarius*) / *collaris* (Schneider) / det. C. A. Tauber '09".

***Chrysopa dampfina* Navás.** A unique type (a female in the MNHN, examined) was designated the Lectotype (Legrand et al. 2008 [2009]: 127). Its labels read: –(1) "Belice, (Honduras), 6.IX.25" [green]; (2) "Chrysopa dampfina Nav., P. Navás S.J. det." [green]; (3) "Typus" [pink]; (4) clear ♀; (5) "Museum Paris, Longin Navas legit 19.." [green]; (6) "LECTOTYPE / *Chrysopa dampfina* Navás, 1928; dés. J. Legrand and C. Tauber '08" [red]; (7) "*Chrysopodes* (*Neosuarius*) *figuralis* (Banks, 1915), det. C. A. Tauber '08". The specimen is teneral and badly discolored.

***Chrysopa acolhua* Banks.** Banks (1948 [1949] **r122:** 156) stated that the type (singular) was in the MCZ. There is one specimen (a male) in the collection; apparently it is the one that Penny et al. (1997: 53) referred to as the "Holotype", and I concur that it is the Holotype (by original designation). The images that are on the MCZ Type Database indicate that the facial markings are typical of *C.* (*N.*) *collaris*; its labels read: (1) "Pungarabato, Guerrero 1260 m, 22–8-30, 1930, *1769, Jose Paner [?], coll" [white, hand-written]; (2) "Mexico A. Dampf" [white, hand-written]; (3) "Chrysopa acolhua Bks" [white, hand-written]; (4) "M.C.Z. Type 27997" [red]; (5) "Chrysopa thoracica Walk. det. P. Adams" [white]; (6) "HOLOTYPE *Chrysopa acolhua* Banks, 1949; det. C. Tauber '09" [red].

Specimens examined (in addition to the type material listed above). **USA. Florida:** Broward Co., Ft. Lauderdale, V-21-1928, D. M. Bates (1F, UMMZ). Collier Co., 10 mi. S. Monroe Station, XI/3/1953, D. Chaffee (1M, TAMU). Dade Co., Key Largo, IV/15/1966, C. V. Covell, Jr. (2M, TAMU), XII/27/1974, L. L. Buschman (1F, MCT), XII/3-XII-20/1965, at light, S. Kemp (11M, 11F, USNM); Miami, light trap, VII/1/1944, VIII/15/1944, D. G. Denning (2F, UMIN). Lee Co., Captiva Is., VI/15/1987, J. E. Eger (2M, 6F, TAMU). Duval Co., Jacksonville, W. H. Ashmead (1F, USNM). Manatee Co., Longboat Key, VII/12/1962, at black light in mangrove, edge of Bay, E. MacLeod (5M, 3F, 1?, TAMU), same I/6–8/1965, at light (1M, TAMU). Monroe Co., Big Pine Key, IV/22/1955, W. W. Warner (1F, USNM); Key Vaca, Crane Pt. Hammock, V/17/1990, E. G. Riley (1?, TAMU); Plantation Key, XI/27/1955, H. V. Weems, Jr. (1M, USNM); 2 mi NW Tavernier, VI/20/73, J. A. Powell (1M, CUIC, 1F, UCB); 9 mi NW Key Largo P.O., VI/18/1973, at light, J. Heppner, J. Powell (1F, UCB). Orange Co., UCF, Orlando, Maidencane Marsh, Malaise trap, I/11/2000, P. Russell, T. Smith, S. Fullerton (1M, CAS, det. N. Penny); Pinellas Co., Indian Rocks Beach, IX/10–11/1954, at light, E. MacLeod (1M, 7F, TAMU); ½ mi. W. Indian Rocks, IX/9/1957, E. MacLeod (1F, TAMU); St. Petersburg (1F, USNM). Polk Co., Lake Alfred, VIII/18/1996, Hibiscus, H. W. Brown (1F, M. J. & C. A. Tauber Lot 96:49, MCT). Volusia Co., VIII/6/1956, H. A. Denmark (1F, USNM). **Texas:** Cameron Co., Boca Chica, VIII/30/1960, O. S. Flint (1M, USNM); Brownsville, XI/1942, E. S. Ross (1F, TAMU, 3F, CAS, det. P. Adams), IX/29/1924, Weed & Pray, F. Mus. Exp. (1F, FMNH), VIII/29/1965, P. J. Spangler (1M, USNM), X/7/1972, J. E. Gillaspy (1M, USNM), IX/16/1942, T. M. Burns (1F, CAS); 6 mi. N. Brownsville, at light, VIII/20/1955, T. J. Cohn (2M, 5F, UMMZ); Harlingen, IX/10/1996, Grapefruit tree, R. Reeve (1M, USNM). Los Fresnos, II/15/2002, J. L. Tveten (1M, TAMU); Sabal Palm Grove Sanct., UV, X/18/2002 (1F, det. J. D. Oswald, TAMU); Sabal Palm Preserve, 3 mi. E Brownsville, XI/16/1990, P. Opler (1F, CSUFC). Hidalgo Co., Bentsen Rio Grande State Park, X/5/1989, at light, W. F. Chamberlain (1F, TAMU); McAllen, VII/2/1938, R. I. Sailer (1F, KU); Weslaco, light trap, XI/21/1940, Riherd (1M, TAMU). **MEXICO. Baja California:** 7 mi. S. Punta Colorado (arroyo), XII/23–30/1987, W. Bloomfield (11F, 5M, SDNHM). **Baja California Sur:** Los Barriles, III/30–31/1984, J. H. Lynch (3F, UCD); Los Barriles, VII/18/2004, W. D. Shepard (2F, UCB); El Salto, 8 mi. NE Todos Santos, X/9/1983, blacklight, Andrews & Faulkner (2F, SDNHM); Puerto Escondito, VI/25 - VII/10/1990, R. Shaver (1F, UCD); Ramal de Naranjas 5 mi. E. Highway 1, 7 mi. S. San Antonio, X/12/1983, blacklight, Andrews & Faulkner (2F, SDNHM); Ramal de Naranjas 6 mi. W. Highway 1 nr. Santa Anita, X/11/1983, blacklight, Andrews & Faulkner (17M, 22F, SDNHM); 12.2 mi. E. Ramal a los Naranjas, III/25/1986, Faulkner & Bloomfield (1F, SDNHM); I. Cerradvo, middle Westside, VII/15/1985, D. K. Faulkner (4M, 2F, SDNHM); Playa San Cristobal, IV/16–19/1984, Brown & Dodero (5M, 1F, SDNHM); Isla San Jose, SW end mangroves, VII/12/1985, D. K. Faulkner (1M, 4F, SDNHM); Isla Santa Margarita, NW island sand dunes, VII/7/1985, Faulkner (1M, 1F, SDNHM); San Isidro, V/21–29/1984, Faulkner, Brown (7M, 8F,

SDNHM); 3.0 mi NE San Isidro (La Purisima) IV/3/198, Bloomfield, Faulkner (1M, 2F, SDNHM); 27.7 mi. NE Arroyo San Miguel, IV/1/1985, Bloomfield, Faulkner (1M, SDNHM); 1.5 mi. NW Miraflores, 700', blacklight, X/28–29/1968, E. L. Sleeper & F. J. Moore (1F, CAS, det. N. Penny); 4.2 mi W. Miraflores, IX/30/1981, F. Andrews & D. Faulkner (2M, 2F, SDNHM); 2.5 mi. SE La Huerta, 2200', blacklight, X/8–9/1968, E. L. Sleeper & F. J. Moore (1F, CAS, det. N. Penny); El Triunfo, X/3/1981, F. Andrews & D. Faulkner (1F, SDNHM); 12.2 mi SE San Perdito near Rancho Saucito, X/8/1981, F. Andrews & D. Faulkner (3M, 4F, SDNHM); El Cien, IX/26/1981, D. Faulkner & F. Andrews (2M, 1F, SDNHM); Rcho. Las Cruces, XI/8/1998, D. K. Faulkner (2M, SDNHM); Loreto, 23.46' N, XII/10/1977 (1F, SDNHM), VII/22/1984, S. E. Miller (1F, USNM); Sierra de la Laguna, 5 mi. S. San Antonio, IX/2–3/1983, D. B. Thomas & C. A. Olson (1F, UAZ); 80 mi. S. La Paz, IV/11/1970, B. Bartlett (1M, CAS, det. P. Adams); 10 km N Cabo San Lucas, III/7–9/1988, N. D. Penny (3M, CAS, det. N. Penny); La Capilla, light sheet, VI/16/1997, W. D. Shepard (1M, UCB); 16 mi. SW San Pedro, light sheets, VI/7/1997, W. D. Shepard (1F, UCB); Las Barracas, ca. 30 km E. Santiago, Malaise trap, X/28-XI/5/1982 (1F, UCB); 24 km. E. San Jose del Gabo, XII/29/1978, P. Rude (1F, UCB). **Chiapas:** 10 mi. W. Palenque, 300 m., VII/31/1986, K. Wolfe (1F, SDNHM). **Colima:** Socorro Is., Revillagigedo Arch., Station 1, sea level, VI/5/1977, Station 2, 1,300 ft., VI/6/1977, C. Hogue & A. Evans, Steele Exped. 1977, Station 5, VI/8/1977, C. L. Hogue (8M, 14F, SDNHM; 4F, 2M, CAS, det. P. Adams); I. Soccoro, Bahia Braithwaite, VI/16/1987, D. K. Faulkner (1F, SDNHM); Isla Soccoro, Calete Grayson, VI/16/1987, UV light, D. K. Faulkner (1M, SDNHM); Revillagigedo Arch., Socorro Island, VII/24–31/1988, L. Baptista (7F, 1M, 1F CAS); Revillagigedo Arch., Socorro Island, Repla Bay, I/22/1996, L. Baptista (5F, 4M, CAS, det. N. Penny); Revillagigedo Arch., Gigedola Is 2000', III/27/1932, Templeton Crocker Exped, 1932 (1F, CAS); Islas Revillagigedo, Isla Socorro, bay at north end, III/3/1975, flight trap, mangrove swamp, L. F. Gomez (1F, CAS); Isla San Benedicto, Herrera Crater, 600', IV/15/1987, D. K. Faulkner (1F, SDNHM); Micro. Cerro Toto, North of Manzanillo, XII/30/1990, Faulkner & Bloomfield (1F, SDNHM). **Guerrero:** 18 mi. S Chilpancingo, VII/18/1963, F. D. Parker, L. A. Stange (2F, CAS); Iguala, VIII/18/1081, at blacklight, J. Chemsak, A. &M. Michelbacher (1M, 2F, UCB); Iguala, el. 750 m, at light, IX/9/1982, J. A. Powell, J. A. Chemsak (1F, UCB); Xalitla, 8 km. N. Mezcala, 580 m, IX/17–23/1982, J. A. Powell, J. A. Chemsak (1F, UCB). **Jalisco:** Ajijic, 5140', VI/24/1964, UV light, W L. Nutting, (1M, UAZ); Mismalaya Rr., IV/24/1977, D. G. Denning (1F, UCD); Estac. Biol. Chamela, VIII/27/1996, W. Godwin, UV light (3M, 2F, TAMU), at light, VII/20–27/1984, J. A. Chemsak, J. T. Doyen (1M, UCB), VII-28-VIII/2/1084, J. A. Chemsak (1M, UCB), VII/20–27/1984, J. T. Doyen (1M, UCB), at lights, VII/28-VIII/2/1984 J. A. Chemsak, J. T. Doyen (1M, UCB), blacklight, XII/16–19/1992, Chemsak & Katasura (1M, UCB). **Michoacán:** Rio Huahua, 1.1 mi E, 52.6 mi. N Playa Azul, XII/31/1990, Bloomfield & Faulkner, (1F, SDNHM). **Morelos:** Acatilpa, VII/16/1965, Flint & Ortiz (1F, USNM). **Nayarit:** Metro. Santa Barbara, VIII/5/1984, VIII/16/1988, Bloomfield (1M, SDNHM); 1 mi.

W Huajicori, III/19/1987, N. Bloomfield (1M, SDNHM); Laguna Sta. Maria, 20 air mi. SSE Tepic, XII/19/1963, M. J. Tauber, C. A. Toschi (1F, UCB). **Nuevo León:** Monterrey, XII/12/1991, at light, W. F. Chamberlain (1M, 1F, TAMU); Linares, at lights, IX/12–18/1976, J. A. Chemsak, J. A. Powell (2F, UCB). **Oaxaca:** Pte. Tlacotepec, S. Tehuantepec, VI/8/1966, Flint & Ortiz (2F, USNM, det P. A. Adams) 23 mi. S. Matias Romero, IV/5/1962, F. D. Parker, L. A.Stamge (2F, 1M, CAS); 3 mi W. El Camaron, VIII/6/1963, F. D. Parker, L. A. Stange (1M, 1?, CAS). **Quintana Roo:** Chetumal, VII/1955, N. J. Krauss (1F, USNM). **San Luis Potosí:** El Salto, VI/3/1967, O. S. Flint, Jr. (1M, USNM). **Sinaloa:** Copala, 605 m, XII/27/1978, C. L. Hogue, Cardwell Expedition CLH 235.1 (1M, LACM); Guachil (log river), VIII/30/1985, Brown, Bloomfield (2M, 2F, SDNHM); 5 mi. N. Mazatlan, VII/1/1965, J. A. & M. A. Chemsak, E. G. & J. M. Linsley (1M, UCB); 12 mi. S. Mazatlan, XII/17/1963, M. J. Tauber, C. A. Toschi, (1F, MCT); Mazatlan, VII/22/1954, W. M. Cazier, W. Gertsch Bradts (1F, AMNH); Microondas la Muralla, VIII/13/1985, Faulkner, Bloomfield (2M, 2F, SDNHM); Navajoa, VIII/5/1986, Faulkner (1F, SDNHM); 1 mi. E. Baviri, bat cave, IX/26/1986, Bloomfield (1F, SDNHM); 16 mi. S. Guamúchil, XI/13/1961, Menke & Stange (2M, LACM;), VI/16/1961, F. D. Parker (1F, UCD), L. A. Stange (7F, CAS); 34 mi N. Los Mochis, VIII/27/1963, F. D. Parker, L. A. Stange (1F, CAS); 8 mi S. Elota, VIII/26/1963, F. D. Parker, L. A. Stange (3F, 2M, CAS). **Tamaulipas:** Ciudad Mante, IX/26/1975, J. A. Powell (1M, UCB); Cd. Victoria, at light, II/28/1999, E. Chouvakhina (M. J. & C. A. Tauber Lot 99:51, MCT) Ciudad Victoria, VIII/10/1972, at black light, G. F. & S.Hevel (1M, USNM); 6 mi S. C. Victoria, 1050', VIII/6/1963 (1M, USNM); 12 mi. SW. Cd Victoria, 4000', at lights, IX/19/1976, J. A. Chemsak, J. Powell (1F, UCB); Guemes, VI/28/1965, P. J. Spangler (1F, USNM); Tampico: 50', XII/29/1963, M. J. Tauber, C. A. Toschi (1F, 1 pupa, M. J. & C. A. Tauber Lot 63:36, 63:86#3, MCT). **Veracruz:** Fortin de las Flores, X/1–2/1975, J. A. Powell (2F, UCB); Puente Nacionale, 6 mi. SE Rinconada, IX-30-1975, J. A. Powell (1F, UCB); Puente Nacional, VI/21/1962, D. H. Janzen (1M, UCB); 36 mi. S. Tantoyuca, 120 m., blacklight, VII/3/1985 (K. Wolfe & M. Valverdi (1F, SDNHM); Citlaltepetl, 3000', VI/21/1965, L. W. Swan (1F, CAS); Cotaxtla Exp. Sta., Cotaxtla, XII/2/1963, D. J. Janzen (1M, UCB). **Yucatán:** Chuminopolis, VIII/6-IX/8/1964, J.C. & D. Pallister (4M, 4F, 1?, AMNH), VII/7/1952, J. & D. Pallister (1F, AMNH); Merida, 10 ft., at light, VIII/14/1963, Scullen & Bollinger (2F, det. Adams, 1998; OSU); Merida, VII/29–30/1964, P. J. Spangler (5M, 7F, USNM); Merida, VIII/27-IX/13 /1964, J. C. & D. Pallister (1M, 2F, 1?, AMNH); Timajas, IV/28/1962, F. D. Parker, L. A. Stange (2F, CAS), VIII/18/1963, F. D. Parker, L. A. Stange (8F, CAS); 5 mi. NE Timajas, VIII/18/1963, F. D. Parker, L. A. Stange (4F, 1?, CAS). **BELIZE.** Roatan Island, French Harbor, 0–50 m, IX/1975, N. L. Krauss (1F, AMNH). **COSTA RICA. Alajuela:** 20 km. S. Upala, II/5/1991, F. D. Parker (1F, USU, det. Penny '92). **Guanacaste:** Parque Nacional Guanacaste, El Hacha, Queb. Pedregal, 10.983 N, 85.539 W, 300 m, VII/27/1987, Holzenthal, Morse, Clausen (1M, det. Penny,'93, UMIN); 21 km S. Canas, E.J.N., M.Ag., VII/27/1990, at light, W. F. Chamberlain (1F, TAMU); 14 km. S. Cañas, V/16–23/1990, VIII/11/1990,

II/1–7/1991, F. D. Parker (3F, USU, det. Penny '92); 20 km. SW Cañas, IX/14/1990, N. D. Penny (1F, CAS, det. N. D. Penny); near Cañas, along river, at light, II/7/1969, J. Sheldon (1F, CAS, det. N. D. Penny); Taboga, VI/26–29/1967, Flint & Ortiz (1M, USNM); S. Cañas Exp Sta, III/8–18/1988, F. D. Parker (1F, USU); Las Canas Rio Corobici, VII/26/1967, O. S. Flint, Jr. (3M, 1F, USNM, det. P. A. Adams). **Puntarenas:** Boca de Barranca, VI/12–14/1972, Hogue & Duckweiler (M, LACM). **EL SALVADOR.** San Salvador VI/15/1958, O. L. Cartwright (1M, USNM); 13 km. N. San Salvador, II/4/1965 (6F, USNM, det. P. Adams); Universidad, II/2/1965 (1F, USNM); Cojutepeque, II/9/1965 (2F, USNM); Quezaltepeque, II/2/1965 (2F, USNM); Santa Teca, VI/3–6/1958, O. L. Cartwright (1F, USNM). **GUATEMALA.** El Progresso. San Agustin Ac. VIII/11–21/1965, Flint & Ortiz (2M, 3F, USNM, det. P. Adams). Retalhuleu: 4 mi. N. Retalhuleu, VII/16/1966, K.U. Survey Course, at blacklight (1F, KU). Zacapa: Rio Teculutan, VIII/18/1965, Flint & Ortiz (1F, USNM). **HONDURAS.** Fco., Morazan San Antonio de Oriente, El Zamarano, VI/22/1992, J. Gavilanez, Zea mays (1M, MCT, det. P. A. Adams); Francisco Prov., Morazán, Talanga, 87°17.92'N 87°14.17'W, 3250 ft., VI/4/1996, F. G. Andrews, A. J. Gilbert (2F, 1M, CAS, det. N. Penny); La Lima, II/9/1974 [or IX/2/1965], UFC NO 442-8. C. Evers (3F, USNM); La Lima, Cortes, VIII/1/1973, U.V. light, P. Adams, (7F, 7M, CAS, det. P. Adams). **NICARAGUA.** Domitila: Rivas Res. Sil. Pr., 400 ft., VI/5–9/2006, W. D. Shepard (1F, UCB). Estelí: Ducuali, VI/13/1967 (2F, 1M, USNM). Managua: Tipitapa, VII/28/1967 (1F, USNM); Leon, U.V., II/12/1989, J. M. Maes (1F, 4M, CAS, det. N. Penny). **PANAMA. Panamá:** Balboa, X/1946, N. L. H. Krauss (1M, USNM); Port of Chorrera [Chorrea?], IX/9/1952 (1M, USNM); Las Cumbres, VII/9/1976, M . Daykin (1M, UCD); Rio Gatun, Port Limon, C. Z., IV/21/1944, K. E. Frick (1F, CAS); Barro Colorado, CZ, VI/18/1980, H. Wolda (1M, CAS, det. N. Penny). **WEST INDIES. ANTIGUA.** St John's, VIII/1967, XII/1967, N. L. H. Krauss (4M, 1F, USNM), St. John's, 0–100 m., VIII/1979, N. L. H. Krauss (1M, AMNH), II/2–3/1965, H. E. Evans (3M, 2F, USNM); Coolidge Airport, XI/1967, N. L. H. Krauss (1M, 3F, USNM). **BAHAMAS. South Bimini Island**, VI/1951, C. & P. Vaurie, VIII/7, 1951 (2F, USNM). **Cat Island:** Bennetts Harbour, III/24/1953, E. B. Hayden (1M, AMNH); McQueen, I/23/1953, E. B. Hayden & L. Giovannoli (1M, AMNH). **Grand Bahama Island:** Freeport, VI/20–27/1987, W. E. Steiner, M. J. & R. Molineaux (1M, 5F, USNM). **Great Abaco Island:** Elbow Cay, Hopetown, VI/1–5/2002, D. G. Marqua (1M, 6F, TAMU). **Great Exuma Island:** Simons Pt., 23.31.50–75.47.30, I/14/1980, I/11/1980, I/26/1980, J. L. McCabe (5M, 7F, CUIC). **New Providence:** Nassau, IV/16/1953, E. B. Hayden (1F, AMNH), VIII/1963, N. L. H. Krauss (1M, AMNH). **San Salvador Island:** nr. Cockburn Town, III/18/1953, E. B. Hayden & G. B. Rabb (1F, AMNH); Rd S. CCFL, V/7–12/1981, R. Rutkauskas, trap (5M, 1F, USNM); Dump Beach, VI/6/1980, A. G. Scarbrough (1F, USNM); San Salvador Isl., V/15/1981, J. R. Powers (1F, UCB). **Turks and Caicos:** South Caicos Island, II/11/1953, E. B. Hayden Jr. (2?, AMNH), II/11/1953, E.B. Hayden & G.B. Rabb (1M, 1F, AMNH); Grand Turk; SE side of North Creek, 21°29'25"N, 71°08'W, II/5/2001, at black light in mixed scrub near salt

pond, W. E Steiner & J. M. Swearington (1F, USNM); Grand Turk, North Wells, 21°29'50"N, 71°08'20"W, II/7/2001, at black light in mixed scrub near salt pond, W. E Steiner & J. M. Swearington (4F, USNM); Grand Turk, VII/16/1954, G. R. Proctor (1F, CAS), VI/11957, T. H. Farr (2M, CAS). **BRITISH VIRGIN ISLANDS. Anegada Island:** Setting Point, 0 m, VII/17–19/1985, U. V. trap, S. & P. Miller (16M, 4F, USNM). **Guana Island:** 0–80 m, VII/5–23/1985, S. E. & P. M. Miller (8M, 10F, USNM), VII/15–23/1985, S. E. & P. M. Miller (5M, 4F, USNM), VII/13–26/1986, S. E. Miller & M. G. Pogue (11M, 13F, USNM), VII/9–23/1987, S. E. Miller & V. O. Becker (4F, BPBM), X/24–31/1990, S. B. Miller & T. M. Kuklenski (1M, 6F, BPBM); Guana I. VII/1–14/1984 (S. E. Miller & P. M. Miller (7M, 13F, USNM), VII/10–11/1988, Malaise trap, S. B. Miller & C. O'Connell (1M, BPBM), VII/13/1988, S. B. Miller & C. O'Connell (1M, BPBM); Guana I. hotel area, 18°29'N, 64°36'W, X/26–27/1992, IV/16/1993, R. R. Snelling (1M, 4F, LACM). **Jost Van Dyke Island:** E. end, XI/19-XII/2/1994, L. M. Wilson & J. B. Johnson (7M, 13F, USNM; 6M, 4F, CAS, det. N. D. Penny; 7M, 3F, M. J. & C. A. Tauber Lot 96:72, MCT). **Tortula Island:** Mt. Sage National Park, 460 m, VII/13–15/1987, S. E. Miller & V. O. Becker (3F, 3?, BPBM). **Virgin Gorda Island:** V. Gorda Peak, ca. 400m, VII/17–19/1986, S. E. Miller & M. G. Pogue (1M, USNM). **CUBA:** Isle of Pines (=Isla de la Juventud), Los Indios, VI/28/1950, Cuba Sur. 564 50-9369, on citrus grandis fruit (1M, USNM); Matsipote [?], II/9/1957, beating cocoloba, P. A. Adams (1?, CAS). **DOMINICAN REPUBLIC: Azua:** East side of crest, Sierra Martin Garcia, 7 km WNW Barrero, 18.21N, 70.58W, 860 m, VII/25–26/1992, C. Young, R. Davidson, S. Thompson, J. Rawlins, cloud forest adjacent to disturbed forest (1F, CMNH). **Bahoruco:** 5.8 km SW Neiba, eastern playa of Lago Enriquillo, 18.25.17N, 71.26.38W, ~5 m, IV/3/2004, J. Rawlins, R. Davidson, C. Young, salt scrub on sandy playa, hand collected, Sample 50143 (3M, teneral, 18F; CMNH). **Barahona:** Paraiso, 20 m, 17°59.1' N, 71°10.0' W, III/21–22/1999, O. S. Flint, Jr. (2M, USNM). Independencia: 4 km S Los Pinos, Loma de Vientos, 18.35N, 71.46W, 455 m, VII/23/1992, R. Davidson, J. Rawlins, S. Thompson, C. Young, semiarid deciduous forest with pastures (1F, CMNH); Rio Las Damas, 2km S Duvergé, 10 m, 18°22.0' N, 71°31.4' W, III/24/1999, O. S. Flint (9M, 4F, USNM); Rio Guyabal, 4.5 km N. Postrer Reio, 150 m 18°34.7'N, 71°37.7'W, III/25/1999). S. Flint (3F, USNM). **La Altagracia:** Parque del Este, Caseta Guaraguao, 4.4 kn SE Bayahibe, 18.19.59W, 68.48.42W, 3 m, V/26–27/2004, C. Young, J. Rawlins, J. Fetzner, C. Nunez, semihumid forest near sea, limestone, hand collected, Sample 51144 (1M, 2F, CMNH). **Maria Trinidad Sánchez:** Nagua, VI/19/1977, Rominger (1F, (UCD). **Monte Cristi:** 10 km S. Monte Cristi, 5m, V/23/1973, D. & M. Davis (1M, 2F, USNM; 1F, CAS, det.P. Adams). **Pedernales:** Pedernales, 10 m, 18°01.8' N, 71°44.7' W, III/18–20/1999). S. Flint, Jr. (2M, 6F, USNM); Sierra de Baoruco, Aceitillar, 25.2 km ENE Pedernales, 18.05.29W, 71.31.16W, 1272 m, VI/14/2003, C. Young, J. Rawlins, C. Nunez, R. Davidson, P. Acevedo, M. de la Cruz, dense broadleaf forest, pine, hand collected, Sample 42242, (4M, 2F, CMNH); RD-082 Trudillé, PNJ, 17°45.184'N, 71°31.670'W, VII/4/2002, D. Perez, B. Hierro, R. Bastardo, d/n (1M,

1F, USNM, det. O. Flint). **Peravia:** RD-052 Pueblo Nuevo, Bani, 97 m. (400 ft), 18°17.757'N, 70°19.601'W, VII/27/2002, D. Perez, R. Bastrado (1M, TAMU); 20 km SW Bani nr Calderas, Blacklight, XII/27/1986, J. Doyen, J. S. Blay (1F, UCB) **San Cristóbal:** X/25/1976, R. S. Rominger (1F, UCD), VI/8–9/1969, Flint & Gomez (1F, USNM). **S. Domingo:** X/9/1966, L. H. (1M, TAMU). **GRAND CAYMAN.** West Bay Dist., Seven Mile Beach, IV/18/2003, W. Reeves (1F, TAMU); Grand Cayman Is., III/26/1982, M. E. C. Giglioli (1?, UCD); East End, trap H, XI/23/1982, M. E. Giglioli (1F, UCD); ?? locality, III/13/1983, M. E. C. Giglioli (1F, CAS, det. N. D. Penny); 3 mi. N. Georgetown, V/26/1975, A. B. Gurney (1F, USNM); III/133/1983. **HAITI.** Port au Prince, Acc 2, 192, R. C. Smith (1? sex, poor condition, USNM, det. E. G. MacLeod). **JAMAICA:** Kingston, I/27–II/6/1975, B. Heineman (2M, 2F, AMNH); Mona, near Kingston, U. West Indies campus, weeds,VII/16/1962, J. Tomlinson (1F, CAS); St. Catherine Parish, Port Henderson, XI/13/1986, W. J. Pulawski (1M, teneral, CAS); St. Elizabeth Salt Pd., Parottee Beach, 17°58.1'N, 77°50.2'W, IV/19/2000, O. S. Flint (1F, USNM); Clar. Par 2 km. S. Rocky Pt., nr. Jackson Bay Cave, 5 m. XII/10/1975, Don & Mignon Davis (1M, USNM); Clarendon: Jackson Bay, 17°44.7'N, 77°12.6'W., V/13/1996, D. & W. Mathis, H. Williams (1F, USNM); Runaway Bay, at lite, VIII/4–9/1987, J. Brown (1F, UCB); St. Catherine Parish, Port Henderson, XI/13/1986, W. J. Pulawski (1M very teneral, CAS). **NETHERLANDS ANTILLES.** Curaçao, Willemstad, X/1950, N. L. Krauss (1F, USNM). **PUERTO RICO. Puerto Rico Island:** Bayamon, at light, VIII/7 [or VII/8]/1932, Anderson & Lesesne, San Juan No 3922 (2M, 1F, USNM); Ponce, Real Anón, hills above Rio Inabón, 18°7'N, 66°34'W, VI/28/2008, at light in gap of mixed montane rain forest, O. H. Garrido, A. R. Perez-Asso, W. E. Steiner, J. M. Swearingen (1F, USNM); Salinas LT, VI/6/1961, J. Maidenado (1M, USNM); Aguirre Cntr., IV/2–3/1931, M.D. Leonard (2M, USNM, det. E. MacLeod). **Maguey Island:** Parguera , XII/18/1962, P. & P. Spangler (1M, 5F, USNM). **Caja de Muertos Island:** Acc. No. 2:52–59, V/27–30/1959 M. Medina (1M, 1F, USNM). **Mona Island**, Camp Copresi, X/27/1955 (2F, USNM, et. E. G. MacLeod); VIII/1939, Maartorell (1F, USNM, det. E. MacLeod). **Vieques Island:** Puerto Real, IV/29/1930, Cornell Univ. Lot 795, Sub 44 (sex?, USNM). **ST. KITTS.** Basseterre, 0–50 m, VII/1976, N. L. H. Krauss (1M, 1F, AMNH). **U. S. VIRGIN ISLANDS. Saint Croix Island:** Mt. Washington & Union, XII/29/1967, W. Cantelo (1M, USNM); St. Croix, Christiansted, XI/20–26/1985, G. E. Bohart (1F, USU); St. Croix, Christiansted, Constitution Hill, VIII/1936, hand net on bushes, at night, H. A. Beatty, No. 587 (3F, 1M, USNM); Orangegrove, W. end, VII/6–16/1967, E. L. Todd (1M. 5F, USNM). **Saint John Island:** Maho Bay, VIII/20–23/1984, L. D. French (3M, 1F, UCD). **Saint Thomas Island:** Estate Lilliandahl, X/25/1978, M. A. Ivie (4F, 1M, UCD). **VENEZUELA. Aragua:** Rancho Grande, 1100m, I/11–15/1966, S. S. & W. D. Duckworth (1M, USNM). **Barinas:** Rio Sto. Domingo Barinas, II/17/1976, C. M. & O. S. Flint, Jr. (1M, USNM). **Lara:** El Cuji, 7 mi. N. Barquisimeto, VI/1/1967, R. W. Poole (5M, 4F, det. Penny,'99, CUIC); 20 km. E Carora, IV/3/1981, A. S. Menke, L. Hollenberg (1F, USNM). **COLOMBIA.** Ant. Finca Fernandes Sopetran, II/14/1983, O. S. Flint, Jr. (1F, USNM).

Known distribution. USA: (Florida, Texas); Mexico; Central America; West Indies [Antigua, British and USA Virgin Islands, Grand Cayman, Nassau, Jamaica, Dominican Republic, Turks & Caicos, Haiti (Smith 1931)]. Records from South America include localities in Colombia, Venezuela, and Guyana (records above and Adams and Penny 1985). One specimen (a female) was collected on an aircraft in Central America (between VII/1944 and III/1945, J. H. Hughes - 903, USNM, det. E. G. MacLeod '63).

Variation. Smith (1931) and Tauber (2003) noted considerable variation in the red coloration on the head and body among adult specimens (Figs 13, 14). Tauber (2003) recorded similar variation in the depth of the larval markings. In the current study, the most darkly marked adult specimens were from the USA, Mexico and Central America; on average, those from the Caribbean Islands had paler markings than the continental specimens. A notable exception is the occurrence of two unusually marked individuals (teneral males) from the Dominican Republic. Both have dark red marks on and surrounding the antennae as well as bright red marks that seem to spill from the head onto the anterior region of the prothorax (dorsum and venter). Some of the tarsi on these specimens are also marked with red.

In addition to the color variation, there is considerable variation in body size (see measurements in descriptions above); this variation appears to be especially pronounced in specimens from the Caribbean Islands [see ranges reported in descriptions above]. In addition, the male and female genitalia express some geographic variation. Some females (e.g., from the Caribbean islands and Venezuela) have shorter and more rounded bursal ducts than females from the continent. And, some male specimens (from the Caribbean islands and Venezuela), especially teneral ones, have delicate gonarcal structures so that the rods of the mediuncus appear to extend from the surface of the gonarcal bridge. However, with careful examination, it can be seen that the rods actually extend from below the bridge.

***Chrysopodes (Neosuarius) figuralis* (Banks, 1915)**

Figs 11b, 12b, 21–27

Chrysopa figuralis Banks, 1915: 626 [MCZ, Lectotype (by present designation): "Chosica, Peru, 2,800 feet, 10 June (Parish)"]; Penny 1977: 18 [species list].

Mallada verticalis Navás, 1929a: 19 [MNHN, Lectotype (by previous designation): "Pérou mérid. Arequipa, Dr E. Escomel, 1922 Mus. Paris"]. Adams 1975: 172 [synonymy with *Mallada* (= *Chrysopa*) *figuralis*]; Penny 1977: 18 [species list]; Brooks and Barnard 1990: 272 [species list, as synonym of *C.* (*N.*) *figuralis*]; Oswald [2007, species list, as *Chrysopodes* (*Neosuarius*) *verticalis* (Navás)]; Legrand et al. 2008 [2009]: 175 [lectotype designation; nomenclature].

Chrysopa dampfina Navás, 1927 [1928]: 324 [MNHN, Lectotype (by previous designation): "Rio Belice, cerca de Belice, Honduras Británicas, en follaje de mangles, 6 de Septiembre de 1925"]. Legrand et al. 2008 [2009]: 127 [synonymy with *C.* (*Neosuarius*) *figuralis*]. (**Moved to synonymy with *C. (N.) collaris* here**).

Figure 21. *Chrysopodes* (*Neosuarius*) *figuralis*: Variation in head and thoracic coloration: **(a)** Chile: Arica **(b)** Peru: Lima **(c)** Peru: La Libertad **(d)** Chile: Arica.

Chrysopa tacorensis Navás, 1934: 15 [MZB, Lectotype (by present designation): "Bolivia: Cerro Tacora, 3.000 m. P. Jaffuel. Ded., Jorge Donoso leg.' B.-D."]. Penny 1977: 21 [species list]; Brooks and Barnard 1990: 280 [species listed under *'Chrysopa' incertae sedis*]; Oswald 2007 [catalog lising]. **New Synonym.**

Suarius figuralis (Banks). Adams 1975: 172 [transfer to *Suarius*]; Núñez Z., E. 1989: 72 [species list, Peru].

Chrysopodes (*Neosuarius*) *figuralis* (Banks). Brooks and Barnard 1990: 272 [transfer to *Chrysopodes* (*Neosuarius*)]; Oswald 2007 [catalog listing, nomenclature].

Diagnosis. *Chrysopodes* (*N.*) *figuralis* is one of four Andean *Chrysopodes* (*Neosuarius*) species with robust, waxy bodies. Unlike the other three species [*C.* (*N.*) *porterinus*, *flavescens*, *escomeli*], the body color is generally light green and the setae are light colored (cream to golden). It can be recognized by its distinctive pair of thick, reddish brown markings on the vertex. The antennae and palpi are light brown, but unmarked; the genae are almost entirely brown, and the tentorial pits above the clypeus are ringed

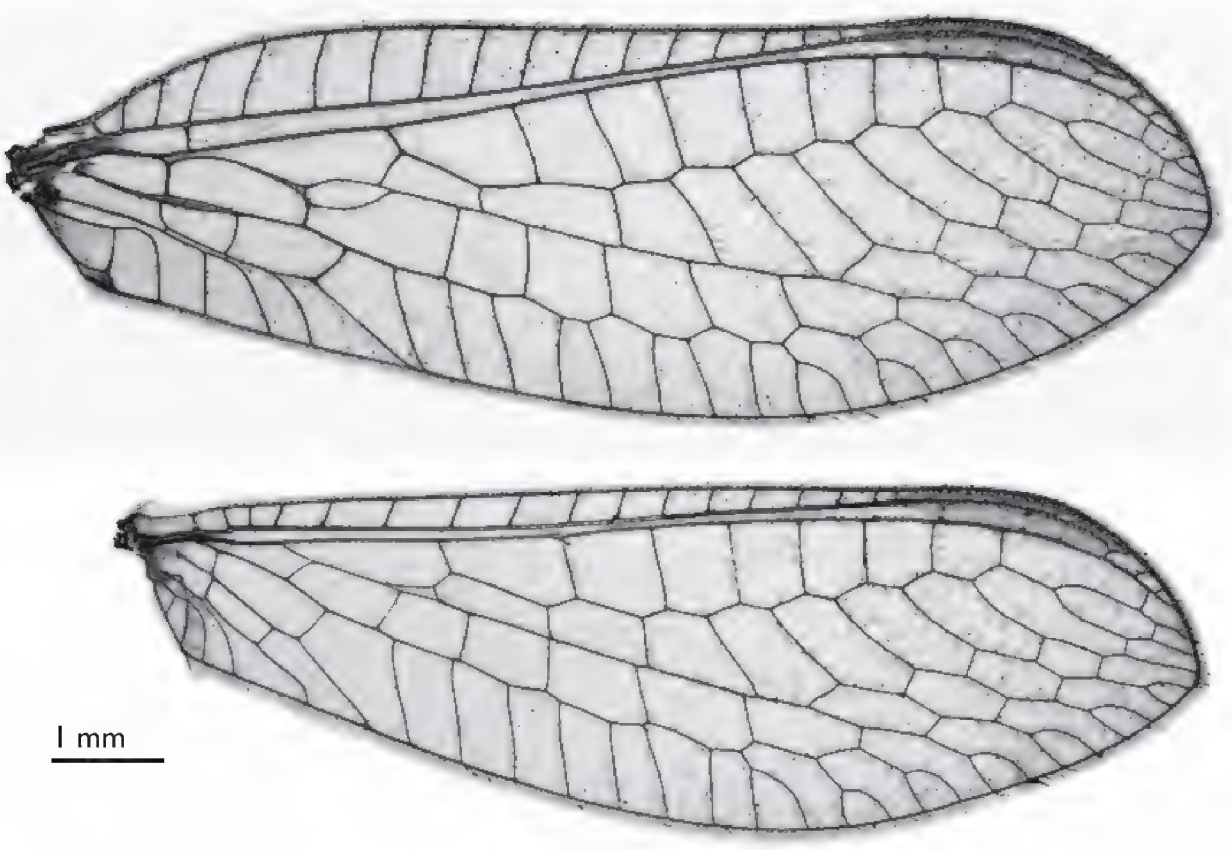

Figure 22. *Chrysopodes* (*Neosuarius*) *figuralis*: Forewing, hindwing (Peru: La Libertad).

with black. The male sternite 8+9 is elongate and robust, but it does not have sclerotized apodemes or invaginations as occur in *C.* (*N.*) *excomeli*, *flavescens* and *porterinus* (compare Fig. 23 with Figs 43, 51 and 67). Also, the ventral apodeme of the ninth tergite + ectoproct lacks caudal and ventral projections; it terminates at the callus cerci. The small gonarcal complex, with its flat-topped mediuncus and abruptly recurved, acutely beaked terminus, also distinguish male *C.* (*N.*) *figuralis* from other *Chrysopodes* (*Neosurarius*) species. *C.* (*N.*) *figuralis* females share a large, circular spermatheca and relatively long, slender spermathecal duct with several other *C.* (*Neosuarius*) species; however, it is the only one with a short, folded bursal duct.

Description. *Head* (Figs 11b, 12b, 21): Width (frontal, including eyes) 1.5–1.8 mm; ratio, head : eye width = 2.2–2.3; distance (straight line) between tentorial pits 0.43–0.51 mm. Distance between antennae ~0.11–0.14 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.44–0.51 mm; length of clypeus ~0.25–0.34 mm. Antenna 0.65× length of forewing (9.8 mm, n=1). Vertex raised slightly, rounded throughout, truncate posteriorly; surface smooth, very small sculpturing on posterior margin, shiny throughout, without setae or folds. Frons shiny, smooth. Clypeus fairly flat throughout, with basal margin straight; surface smooth; anterior margin with row of small setae. Labrum flat; surface smooth; distal margin setose, indented mesally.

Head coloration: Head cream-colored, with reddish brown marks. Vertex with pair of curved, wide, brown or reddish brown, longitudinal marks; pair of thinner, longitudinal, brown stripes next to, but not touching eyes; diffuse brown stripe from mid-scape to base of toruli; brown margin around toruli, extending forward as reddish interantennal mark. Frons with diffuse brown or red marks below antennae, mesal to eyes, along clypeal margin; tentorial pits margined with brown or black. Clypeus,

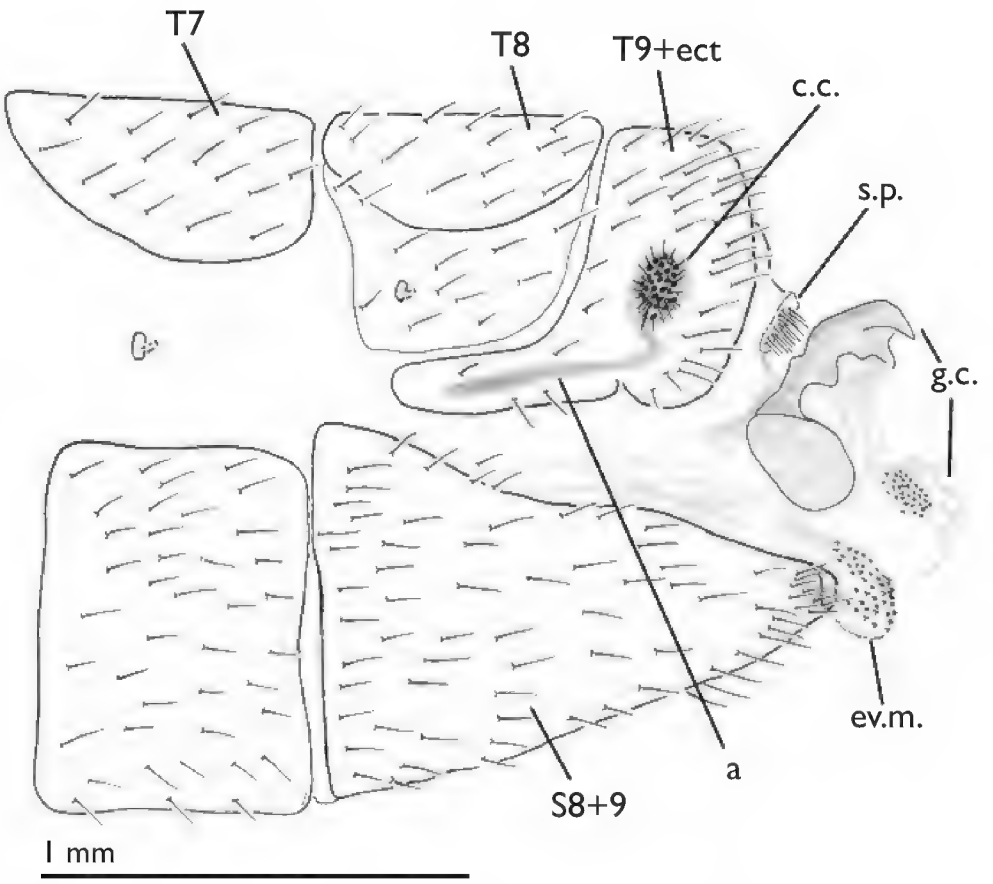

Figure 23. *Chrysopodes* (*Neosuarius*) *figuralis*: Male terminus, lateral (gonarcal complex, membrane at tip of S8+9, and anal region inflated). **a** apodeme on T9+ectoproct **c.c.** callus cerci **ev.m.** eversible membrane **g.c.** gonarcal complex **s.p.** setose subrectal plate **S8+9** fused eighth and ninth sternites **T7** seventh tergite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct.

cream to light brown. Labrum cream. Genal area cream, with amber or tan stripe, or broad, brown stripe. Scape, pedicel cream to amber; flagellum cream-colored, with brown setae. Maxillary, labial palpi with distal segments amber to brown. Venter cream-colored to light tan.

Thorax (Fig. 11b, 21): Pronotum 1.4–1.8× wider than long: 0.67–0.97 mm long; 1.1–1.3 mm wide; mottled light green to light green with a large, brown dorsal stripe mesally, dense covering of very short, pale setae. Mesonotum from mottled green with cream-colored and brown patches to golden with dark brown mesal stripe; robust, golden to dark brown setae dorsally. Metanotum from cream-colored with mesal yellowish stripe to golden with some brown spots mesally, with golden-brown to black dorsal setae. Pleural areas cream-colored to amber, without markings. Legs pale cream-colored to amber, without markings; setae pale to very light brown. Tarsal claws shallowly cleft, with quadrate base.

Wings (Fig. 22): Forewing 11.6–15.3 mm long, 4.6–4.9 mm wide; L:W (midpoint) ratio, 2.6–3.0. Costal margin slightly sinuous; apex fairly broad, rounded. Distal section of M (before furcation of M1 and M2), ma, m-cu1, base of Cu1 (above icu1) slightly thickened. Costal area not enlarged; height of tallest costal cell (#6, 7) = 4.2–4.8× length of first costal vein, 0.13–0.20× width of wing. Subcosta, radius slightly sinuate; most subcostal veinlets, radial cells slightly bent or straight. Eight to twelve closed radial cells (between R and Rs), height of tallest radial cell 1.3–1.6× width;

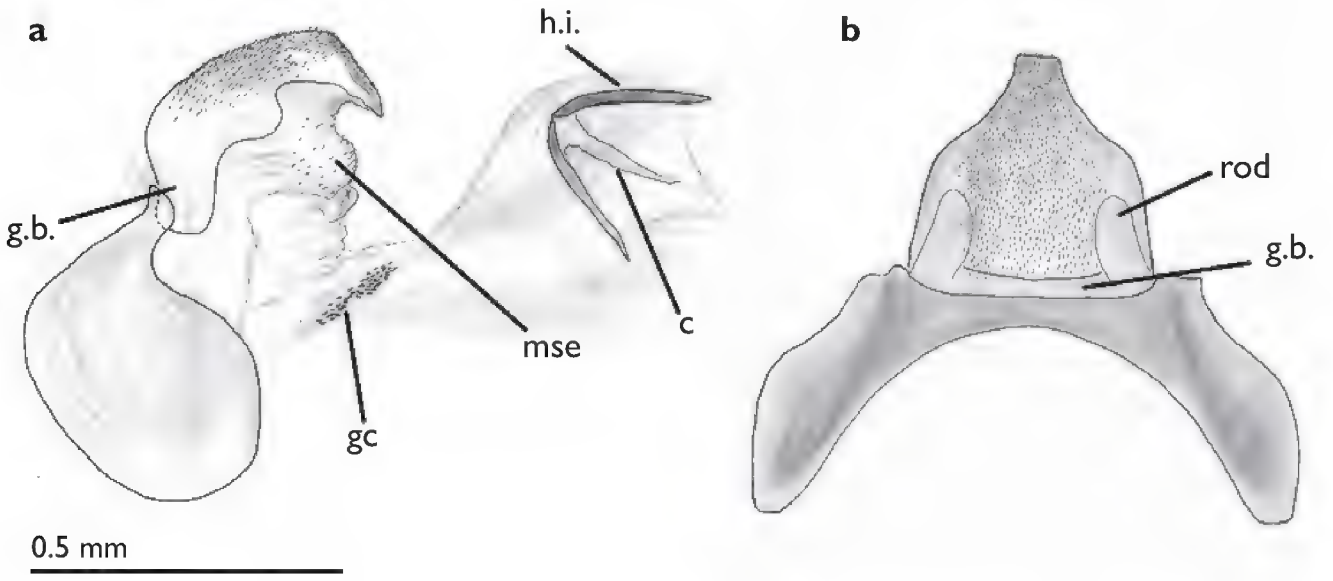

Figure 24. *Chrysopodes* (*Neosuarius*) *figuralis*: Male genitalia. **(a)** gonarcus, lateral (gonosaccus and lower membrane expanded) **(b)** gonarcus, dorsal (gonosaccus, not shown). Both images to scale on left. **c** combes **g.b.** gonarcal bridge **gc** gonocristae **h.i.** hypandrium internum, dorsal **mse** microsetae on gonosaccus **rod** internal rod of mediuncus.

other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four b' cells. First intramedian cell ovate, 0.5–0.6× width of third medial cell; inner row of three to six gradate veins; six outer gradate veins; both rows ~regularly stepped, slightly convergent on each other. Second cell beneath Rs with i.g. at base = 1.6–2.0 mm tall, 2.8–3.4× width; third cell = 1.6–1.9 mm tall, 3.0–3.3× width. Second gradate cell 0.9–1.3 mm tall, 1.8–2.5× width; third gradate cell 0.8–1.3 mm tall, 1.8–2.8× width. Length of second cell beneath Rs with i.g. at base = 1.4–1.7× length of second gradate cell. Three intracubital cells, distal one open, icu1, icu2 each shorter than icu 3; icu1 shorter than icu2. Vein 1A forked. Hindwing narrow, with apex rounded to slightly acute; 10.5–12.2 mm long, 3.3–4.3 mm wide. Eight to twelve radial crossveins; three to five inner gradates; six to eight outer; three b cells, plus small t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline, with stigma cloudy, pale. Longitudinal veins green, except Rs with basal segment dark brown, junctions with crossveins usually dark brown/black. Forewing radial crossveins, costal veinlets, radial crossveins, r-m1, gradates, distal crossveins, cubital crossveins, distal segments of anal veins dark brown to black. Hindwing with radius dark brown at junctions with crossveins; basal radial crossveins green, distal ones brown; costal veinlets, gradates brown; other crossveins mostly green.

Abdomen (Figs 23, 25): Dorsum green with yellow mesal stripe dorsally, green laterally, brownish ventrally; callus cerci yellow or cream colored. Tergites 6, 7: roughly quadrate, with rounded, convex margins ventrally; length 1.9–2.2 times greater than height (lateral view); with long, sparse setae. Pleural region P6 (♀, ♂) and P7 (♂) with sparse, short setae. Sternite 6: quadrate, with dorsal margins relatively straight; length ~0.8–0.9× height (lateral view); with dense setae. Spiracles oval, not enlarged, 0.05–0.06 mm diameter; atria not enlarged.

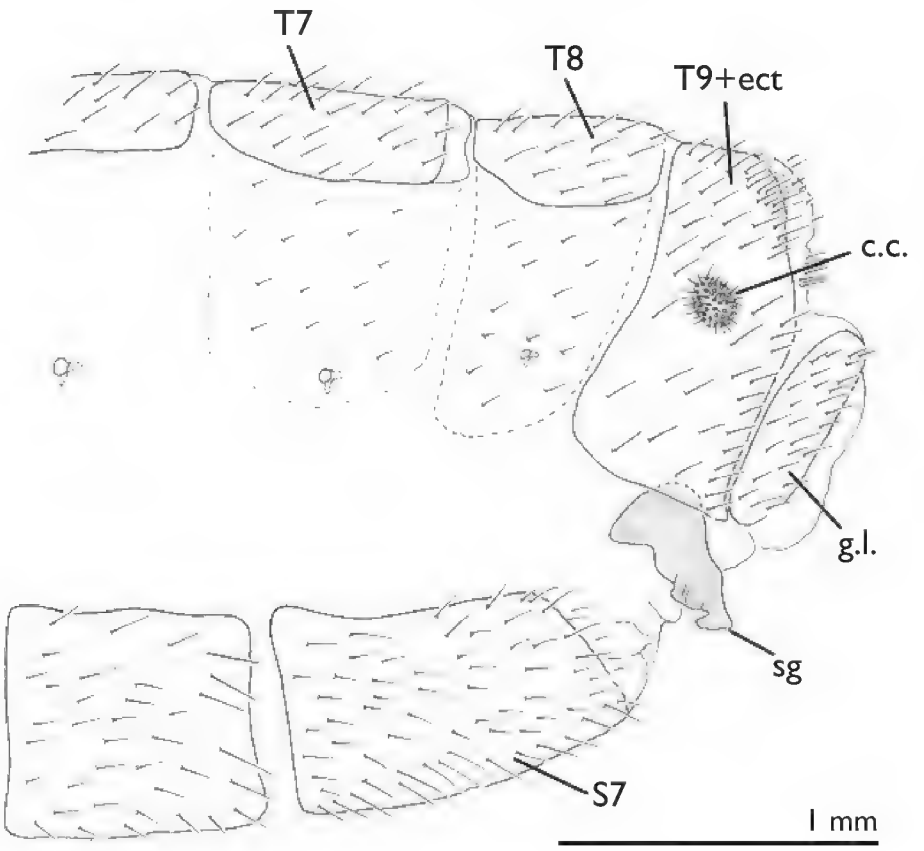

Figure 25. *Chrysopodes* (*Neosuarius*) *figuralis*: Female terminus, exterior, lateral. **c.c.** callus cerci **g.l.** gonapophysis lateralis **sg** subgenitale **S7** seventh sternite **T7** seventh tergite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct.

Male (Figs 23, 24): T8 straight anteriorly, rounded posteriorly (lateral view), ventral extension lightly sclerotized, with setae. Left, right T9+ectoproct fused dorsally; terminal edge straight vertically, bearing vertical field of dense, setae distally; ventral margin with straight, horizontal apodeme; distal end of apodeme extending diffusely upward, over callus cerci, without caudal or ventral arms. Callus cerci oblong (0.16–0.19 mm tall : 0.11–0.12 mm wide) with ~31 trichobothria. S8+9 triangular in shape, without depression, knob, invagination, or apodeme; length ~ 1.75× proximal height, ~2.2× mesal height; apex at an acute angle in lateral view, concave in posterior view; terminus with moderately dense field of setae, thick membrane bearing dense field of microsetae. Subanal plate distinct, with patch of robust setae. Gonarcus broadly arcuate, tightly attached to T9+ectoproct via short subanal membrane. Gonarcal bridge robust, broad; span of gonarcal bridge ~0.20 mm, span between gonarcal apodemes distally ~0.42 mm. Gonarcal apodemes round, smooth. Mediuncus well sclerotized, wide, flat dorsally, broadly attached to gonarcal bridge, dorsum covered with long, fine microsetae; internally with pair of flat, robust rods extending outward from frontolateral edge of gonarcal bridge, not tapering or approaching each other distally; apex curving downward in somewhat flat beak; membrane immediately below beak bearing 2–3 pairs of very small setae. Gonosaccus extending from tight membrane below mediuncus, large, surface with patches of small, elongate gonocristae. Hypandrium internum broadly U-shaped, with delicate internal rods; comes slender, rod-like, extending upturned distally.

Female (Figs 25–27): Tergite 8: depth of fully sclerotized portion approximately one-half length of sclerite; depth of less sclerotized ventral extension more than length

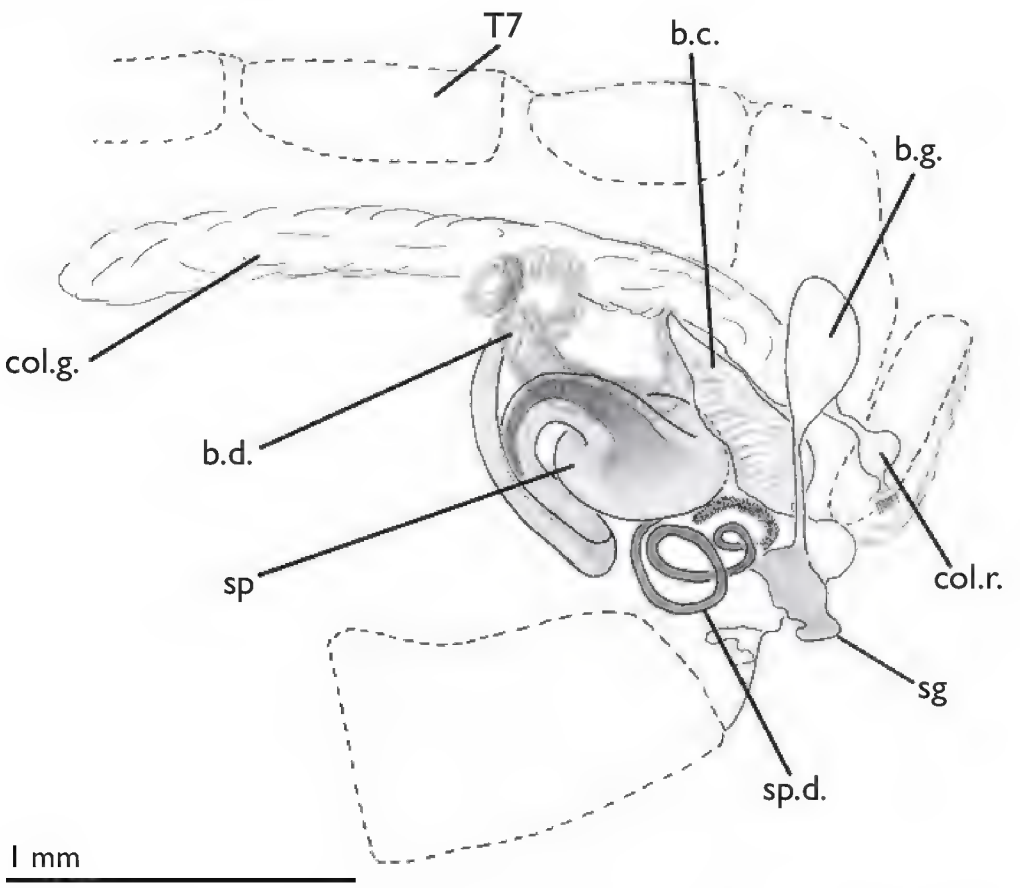

Figure 26. *Chrysopodes* (*Neosuarius*) *figuralis*: Female terminus, interior, lateral. **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **col.g.** colleterial gland **col.r.** colleterial reservoir **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct **T7** seventh tergite.

of sclerite, with fairly long, slender setae. Ninth tergite + ectoproct with proximal margin (lateral view) gently curved below mesal region of T8, with dorsal 1/3 of distal margin relatively straight, ventral 2/3rd curved around gonapophyses laterales; ventral margin extending below ventral margin of gonapophyses laterales. Callus cerci slightly taller than broad (0.15–0.17 mm tall, 0.13 mm wide), with 29–35 trichobothria. Gonapophyses laterales slightly less than 1/2 length of T9+ectoproct, almost ~2.5× taller than wide, elliptical, rounded dorsally, ventrally, largely orientated posteriorly (~55° angle from midline), with long, relatively thin setae. Seventh sternite (lateral view): length ~1.4–1.5× height of proximal margin (lateral view); distal 1/4 of dorsal margin straight; with long, slender setae. Subgenitale short, attached to S7 via very shallow fold; terminus with small, rounded, bilobed knob; area between lobes flat; broad lip below lobes. Pair of large, bulbous bursal glands with elongate, narrow ducts opening dorsolaterally on posterolateral margin of bursa, without accessory ducts. Bursa small, extending only partially over spermatheca; dorsal surface transversely fluted, with sharp-edged folds; bursal duct extending ventrally from right anterior tip of bursa. Bursal duct membranous, with spiny fluting, short – extending from tip of bursa posteriorly to base of spermatheca, without coils or large loops. Spermatheca round, funnel-shaped distally, smooth throughout, with conical velum tapering, bending, becoming tubular; ~0.52 mm in diameter, ~2 mm in length (including velum and smooth tubular extension); invagination ~0.6 mm deep, ~0.02 mm wide at opening, tapering distally. Spermathecal duct ~2.7 mm, arising from right ventral side of sper-

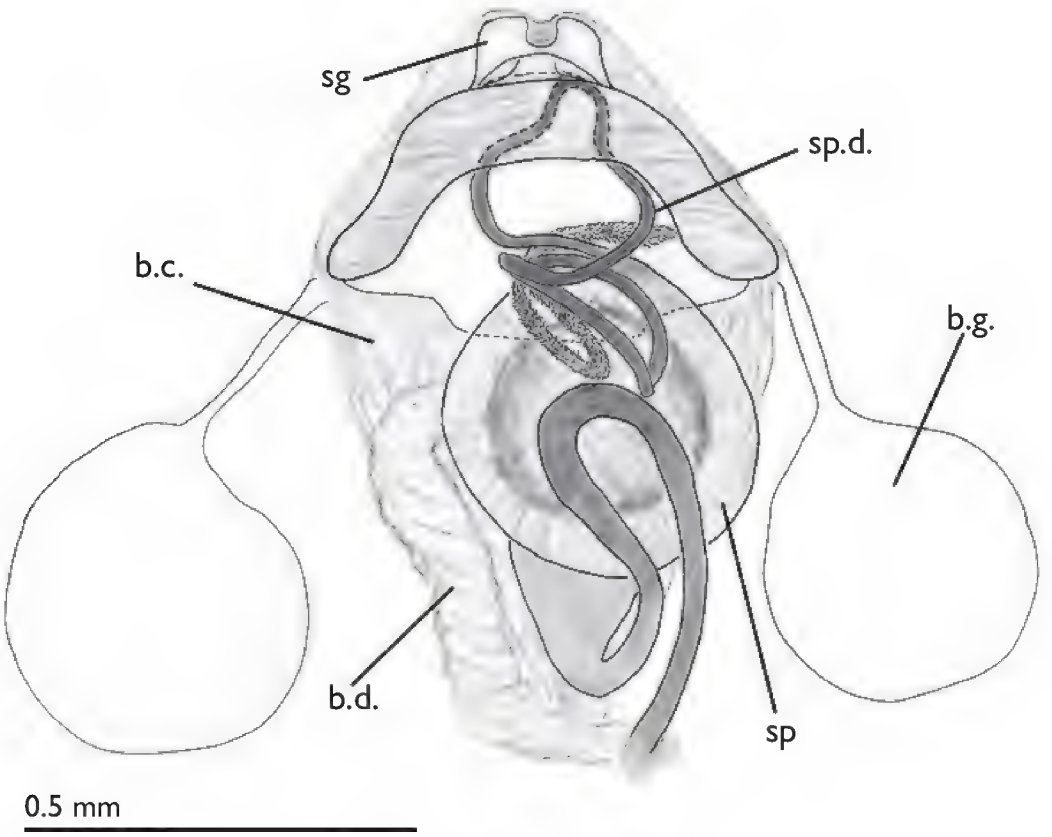

Figure 27. *Chrysopodes* (*Neosuarius*) *figuralis*: Female genitalia, ventral. **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

matheca, extending into subgenitale, with several U-shaped bends, curves, no coils; basal ½ smooth, slender; distal ½ setose, thicker. Colleterial gland elongate, extending well into A6, with grainy texture; small, bulbous, grainy reservoir immediately before transverse sclerotization; accessory glands not found. Transverse sclerotization well-formed, flat, ellipsoid plate, with elongate comb-like teeth, located centrally within gonapophyses laterales.

Larvae. Unknown.

Eggs. Unknown.

Biology. Unknown. Adult specimens were collected in all months except December and January.

Type material. ***Chrysopa figuralis* Banks.** The number of syntypes was not mentioned in the original description. The male specimen in the MCZ (examined) is here considered to be the Lectotype (present designation). Its labels read: – (1) "Chosica Peru, 2800 ft. 10-VI"; (2) "Parish coll"; (3) "type"; (4) "Chrysopa figuralis Bks. Type"; (5) "Type 11984"; (6) "LECTOTYPE, *Chrysopa figuralis* Banks 1915, desig. C. A. Tauber, 2008". Abdomen cleared, stained, in glycerin on separate pin with label: "Abdomen, *Chrysopodes figuralis* (Banks) type, diss. C. A. Tauber 2003". [Note: Specimen slightly teneral (e.g., gonarcal apodemes not fully sclerotized, rhomboid in lateral view); abdomen with all segments before A7 badly torn; gonarcal complex not everted, attached to and within abdominal cavity; gonosaccus completely within abdominal cavity.]

***Mallada verticalis* Navás.** A female in the MNHN (examined) was designated as the Lectotype (Legrand et al. 2008 [2009]): 175. Its labels read: – (1) "Museum

Paris, Pérou mérid., Arequipa, Dr E. Escomel 1922" [green]; (2) "n° 14"; (3) "Mallada verticalis Nav., P. Navás S.J. det." [green]; (4) "TYPE"; (5) "Chrysopa (Suarius) figuralis, ♀ Banks '15, det. P. Adams 1974"; (6) "LECTOTYPE, *Mallada verticalis* Navás, 1929; dés. J. Legrand and C. Tauber '08" [red]. (7) "*Chrysopodes* (*Neosuarius*) *figuralis* (Banks), det. C. A. Tauber 2008".

***Chrysopa tacorensis* Navás.** Originally, Navás had at least two types, one was left in the SDEI, but it was destroyed in the aftermath of WWII (C. Kutzscher, 2009, personal communication). The second, a female in the MZB (examined), is considered the Lectotype (present designation); its labels read: (1) "Cerro Tacora / (Bolivia) / 3000m." [white, discolored, hand-written (Navás)]; (2) "Chrysopa / tacorensis Nav. / det. Navás S. J." [light green, hand-written (Navás), printed]; (3) "Tipo" [red, hand-printed]; (4) "Chrysopa (Suarius), prob. / figuralis / Banks 1914, ♀ / det. Adams '74" [white]; (5) "LECTOTYPE, *Chrysopa tacorensis* Navás, desig. C. A. Tauber, 2008" [red]; (6) "*Chrysopodes figuralis* (Banks), det. C. A. Tauber, 2008" [white]; (7) "78-1698 MZB" [white]. The genitalia are on a separate pin (in a vial with glycerin); labeled: (8) "Genitalia ♀, Chrysopa tacorensis Navás LECTOTYPE, dissected C. A. Tauber, 2008".

Specimens examined (adults, in addition to type material listed above). **CHILE. Arica and Parinacota:** Arica, Cuya, 100m, II/16/1989, R. Miller & L. Stange (69M, 43F, FSCA); Valle Azapa, 6k. E. Arica, II/16/1989, R. Miller & L. Stange (4M, 7F, FSCA); Tarapacá[?], Azapa, Arica, II/5/1965, Luise Peña (1M, det. P. A. Adams, FSCA); Puente Chapa, 45k. S. Arica, 300m, II/20/1989, R. Miller & L. Stange (4M, 1F, FSCA); Puente Chapa, 46k. S. Arica, 300m, II/15/1989, R. Miller & L. Stange (8M, 6F, FSCA); Azapa, Arica, II/5/1965, L. E. Peña (2M, 2F, CAS, det. P. A. Adams 1973); Lluta, Arica, II/7/1965, L. E. Peña (4M, 1F, CAS, det. Adams' handwriting); Iquique, Quebrada de Chiza, II/11/1989, R. Miller & L. Stange (3M, 3F, FASC); Tarapacá, 50k. S. Arica, Puente Chapa, II/15/1989, R. Miller & L. Stange (3F, FSCA); Camarones, Tarapaca, XI/30/1962, L. E. Peña (1M, CAS, det. Adams '75); Tarapaca, Mouth of Liuta River, 18°25'S-70°06'W, X/1/1966, M. E. Irwin (1F, CAS); Tarapacá, Cachones, Salar de Pinatados, IX/8/1966, UV light, G. Loayza, L. Campos (2M, 1F, CAS). **ECUADOR. Guayas:** 3 mil. N. La Libertad, I/28/1955, E. I. Schlinger & E. S. Ross (1M, CAS). **Loja:** San Pedro, w/Loja, VIII/14/1965, L. E. Pena (7F, 2M, CAS). **Loja:** /San Pedro, w/Loja, VIII/14/1955, L. E. Pena, (2F, CAS). Rio Leon, 1700 m, 3°33S 79°16W, III/22/1965, L. E. Peña (16F, 5M, 1?, CAS). **Tungurahua (?):** El Palmá, II/27/1965 (1M, CAS). **PERU. Ancash:** 22 mi. N. Casma, III/24/1951, Ross & Michelbacher (1M, CAS). **Cajamarca:** Jaén, Fucara. Rio Huancabamba, 900 m, I/14–18/1964, P. C. Hutchison & J. K. Wright (1F, CAS). **Lima:** Cupiche, VII/28/1982, R. B. Miller & L. A. Stange (1M, FSCA); Cupiche, 10 km. N. Chosica, VI/25-VII/2/1974, C. Porter & L. Stange (1M, FSCA); Santa Rosa de Quives, nr. Yangas, 1100 m, V/28/1996, J. G. Rozen & A. Ugare (1M, AMNH). **Piura:** Querecotillo, VII/23/1982, R. B. Miller & L. A. Stange (1F, FSCA). **La Liberdad:** Simbal, VII/4/1976, L. Stange & C. Porter (3M, FSCA); Samne, VII/26/1982, R. B. Miller & L. A. Stange (1F, FSCA); 15 km W. Samne, VII/26/1982, R. Miller & L. Stange (1F, FSCA), Sand Hills, E. Laredo, VII/14/1982, B. Miller (1M, FSCA), VII/25/1982, B.

Miller (1F, FSCA); 15 mi E. Trujillo, 500 m., I/16/1955, E. I. Schlinger & E. S. Ross (1F, CAS). **Lambayeque:** Lambayeque, III/5/1981, M. E. Irwin (1F, INHS); 40 mi. N. Chiclayo, I/17/1955, E. I. Schlinger & E. S. Ross (4M, 3F, CAS). **Lima:** Lima, Cañete, cotton, E. Nuñez (1F, CAS, pale); 43 mi. E. Olmos, I/18/1955, E. I. Schlinger & E. S. Ross (1M, 1F, CAS). **Puno:** IV/7/1951, Ross & Michelbacher (1F, CAS). North Central Coast, IV/1/1951, Michelbacher (1F, CAS).

Known distribution. Bolivia, northern Chile, Ecuador, Peru.

Variation. *C.* (*N.*) *figuralis* shows considerable geographic variation in size, as well as head and body markings. Specimens from northern South America (Peru and Ecuador), compared with those from further south (Chile), are generally at the lower end of the size range. They also tend to have fainter head and body markings. In some cases, the brown head and thoracic markings are either pale or absent, and palpal color is cream to amber to brownish. It also appears that coloration and markings may intensify with age and/or maturation.

Chrysopodes (Neosuarius) krugii (Kolbe, 1888), New Status, New Combination

Figs 11c, 12c, 28–35

Chrysopa krugii Kolbe, 1888: 173 [ZMB, Lectotype (by present designation): "Portoriko"]. Penny 1977: 21 [species list]; Adams and Penny 1985 [1987]: 436 [synonymy with *Chrysopodes collaris* Schneider (1851)]. Herein, reinstated as a biologically distinct species.

Diagnosis. *Chrysopodes* (*N.*) *krugii* is very similar to C. (*N.*) *collaris,* the species with which it was synonymized for 25 years. The two species share the following characteristics: a robust, green body with a distinct, mid-dorsal yellow stripe and almost identical wing size, shape and venation. Their status as separate species is supported by differences in head and thoracic markings and significantly divergent genitalia (male and female). Most *C.* (*N.*) *krugii* can be distinguished from *C.* (*N.*) *collaris* externally by their bright rosy-red, lateral stripes on the prothorax (Fig. 11c), their lack of facial markings other than red genal marks that extend in a triangular shaped mark to the tentorial pits (Fig. 12c), and the all green venation of their forewings.

Some populations lack the distinguishing external characteristics and can only be identified by their distinctive genitalia. Unlike *C.* (*N.*) *collaris* males, *C.* (*N.*) *krugii* males have a ventral apodeme (T9+ectoproct) with only one ventral arm; the mediuncus and sclerotized rods arise from the frontal margin of the gonarcal bridge, not below it. Like *C. N. collaris*, the *C.* (*N.*) *krugii* female terminalia are typified by a relatively wide, funnel-shaped spermatheca with a broad ventral invagination and an elongate, curved velum (Fig. 35). In both species, the bursa appears leathery and does not completely cover the spermatheca; the spermathecal duct is long, narrow, and well sclerotized basally, loosely coiled, less sclerotized, and enlarged distally. In *C.* (*N.*) *krugii*, the bursal duct is long (~ twice the length of the abdomen, but it does not approach the

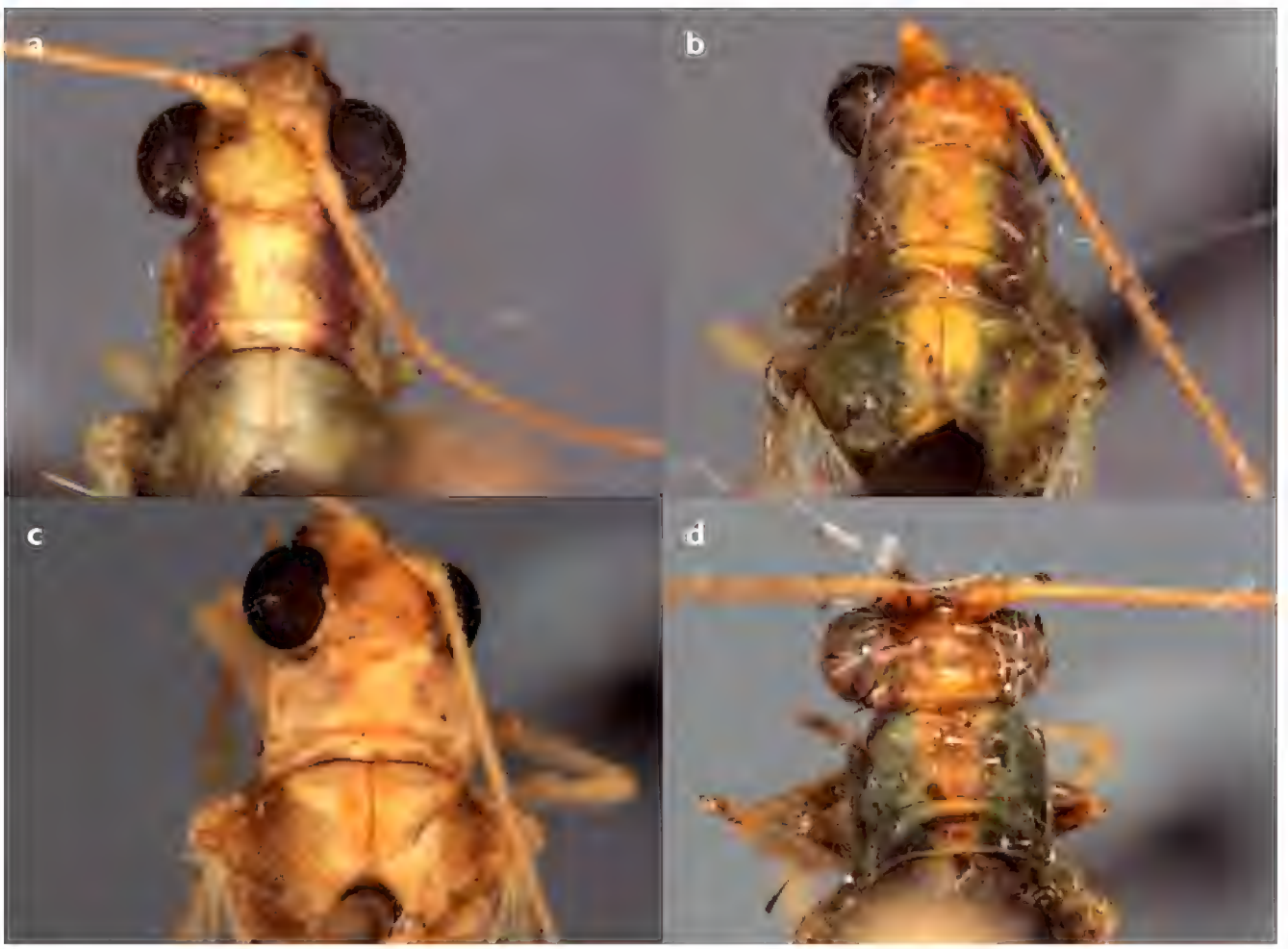

Figure 28. *Chrysopodes* (*Neosuarius*) *krugii*: Variation in head and prothoracic coloration: **(a)** West Indies: Dominica **(b–d)** West Indies: Puerto Rico.

length of the *C.* (*N.*) *collaris* bursal duct, which greatly exceeds twice the abdominal length. Also, the *C.* (*N.*) *krugii* bursal duct is more robust, and usually more tubular, as opposed to delicate, flat, and ribbon-like in *C.* (*N.*) *collaris* (Figs 20, 35).

Description. *Head* (Figs 11c, 12c, 28, 29): Width (frontal, including eyes) 1.3 - 1.8 mm; ratio, head : eye width = 1.6–1.7:1; distance (straight-line) between tentorial pits 0.42–59 mm. Distance between antennae ~0.08–0.10 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.40–0.46 mm; clypeus ~0.23–0.29 mm long. Antenna ~1.25× length of forewing (10.8–11.4 mm). Vertex raised slightly, rounded throughout, truncate posteriorly; surface smooth, very slight sculpturing on posterior margin, shiny, with micropores throughout. Frons relatively flat, unsculptured; surface smooth, with micropores, microsetae. Clypeus unsculptured; surface smooth; distal margin straight; anterior margin with row of small setae. Labrum flat; surface smooth; distal margin setose, indented mesally.

Head coloration: Head entirely yellow, except genae, lateral margin of clypeus, sometimes lateral margin of frons deep red. Antenna yellow, with amber colored setae. Maxillary palp cream-colored, sometimes amber-colored distally. Labial palp pale. Venter cream, unmarked.

Thorax (Fig. 11c, 28): Pronotum 1.3–1.7× wider than long: 0.93–1.17 mm long; 1.28–1.46 mm wide; light green to cream laterally, with pair of broad, sublateral, longitudinal red bands, broad, mesal, yellow stripe; numerous long, pale setae (longest 0.24–0.26 mm long). Meso-, metanota light green to green laterally, with broad, mesal

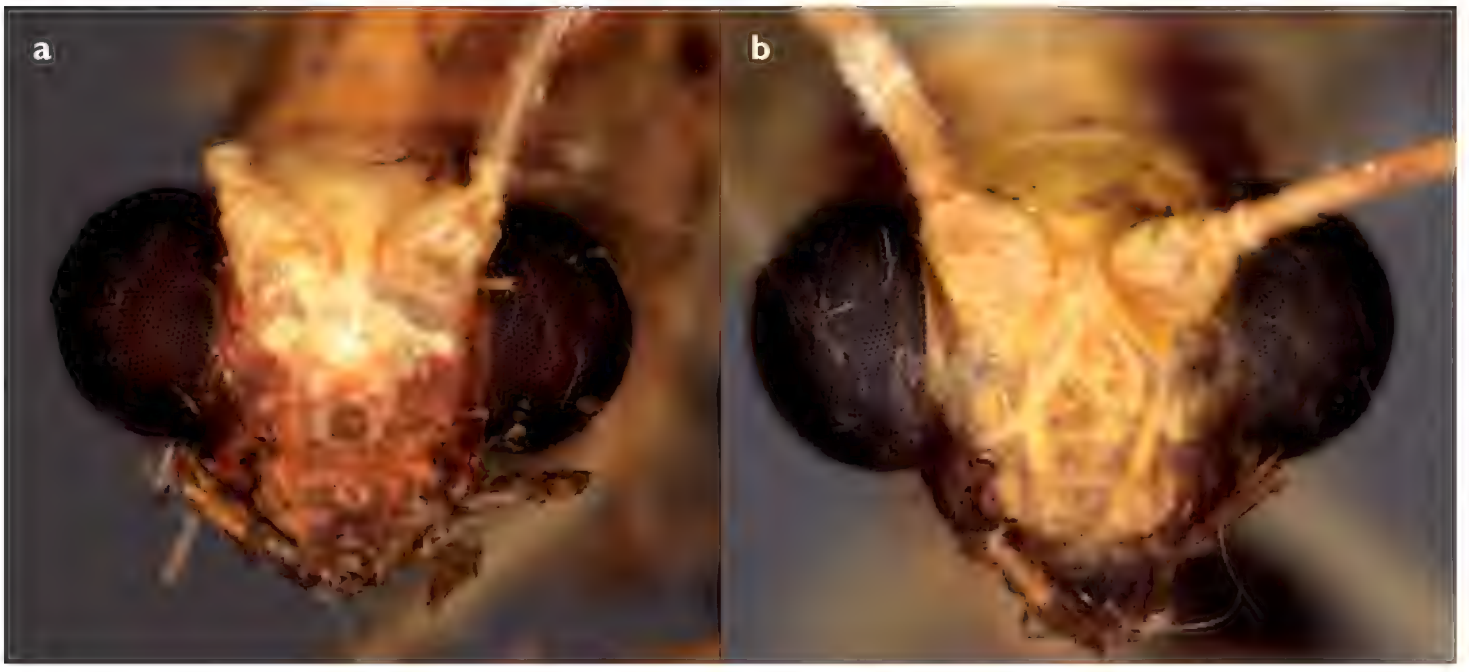

Figure 29. *Chrysopodes* (*Neosuarius*) *krugii*: Variation in facial coloration: **(a)** West Indies: Dominica **(b)** West Indies: Dominica.

yellow stripe, short setae. Pleural areas pale yellow without markings. Legs cream to light green, without markings; tarsi amber-tinged. Tarsal claws dark amber, recurved with deep, narrow cleft, quadrate base.

Wings (Fig. 30): Forewing 12.4–15.1 mm long, 3.9–4.8 mm wide; L:W (midpoint) ratio, 3.1–3.2 : 1. Costal margin slightly rounded to straight; apex broad, rounded. Costal area not enlarged; height of tallest costal cell (#5–9) = 3.3–4.2× length of first costal veinlet, 0.15–0.20× width of wing. Subcosta, radius sinuate; most subcostal veinlets, radial crossveins straight or slightly bent. Twelve to 14 closed radial cells (between R and Rs), height of tallest radial cell 1.4–1.7× width; other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four to five b' cells. First intramedian cell ovate, 0.6–0.7× width of third medial cell; inner row of five to eight gradate veins; eight to ten outer gradate veins; both rows ~regularly stepped, roughly parallel to each other throughout. Second cell beneath Rs with i.g. at base = 1.6–2.1 mm tall, 3.2–4.1× width; third cell = 1.4–2.2 mm tall, 3.0–4.2× width. Second gradate cell 1.3–1.4 mm tall, 3.1–3.9× width; third gradate cell 1.3–1.4 mm tall, 3.0–4.7× width. Length of second cell beneath Rs with i.g. at base = 1.2–1.6× length of second gradate cell. Three intracubital cells; distal one open, icu1, icu2 each shorter than icu3; icu1, icu2 similar in length. Vein 1A forked. Hindwing narrow, with apex somewhat acute: 11.3–13.4 mm long, 2.4–3.8 mm wide. Twelve to 14 radial crossveins; four to six inner gradates; seven to nine outer gradate veins; three b cells, t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline, with stigma transparent to slightly opaque. Longitudinal veins green; costal veinlets, crossveins green, except population from Puerto Rico with forewing costal veinlets, radial crossveins, gradates brown or marked with brown at bases and tips.

Abdomen (Figs 31, 33): Dorsum light green, with narrow, yellow mesal stripe, no markings; venter cream colored; callus cerci light green. Tergites 6, 7: roughly quad-

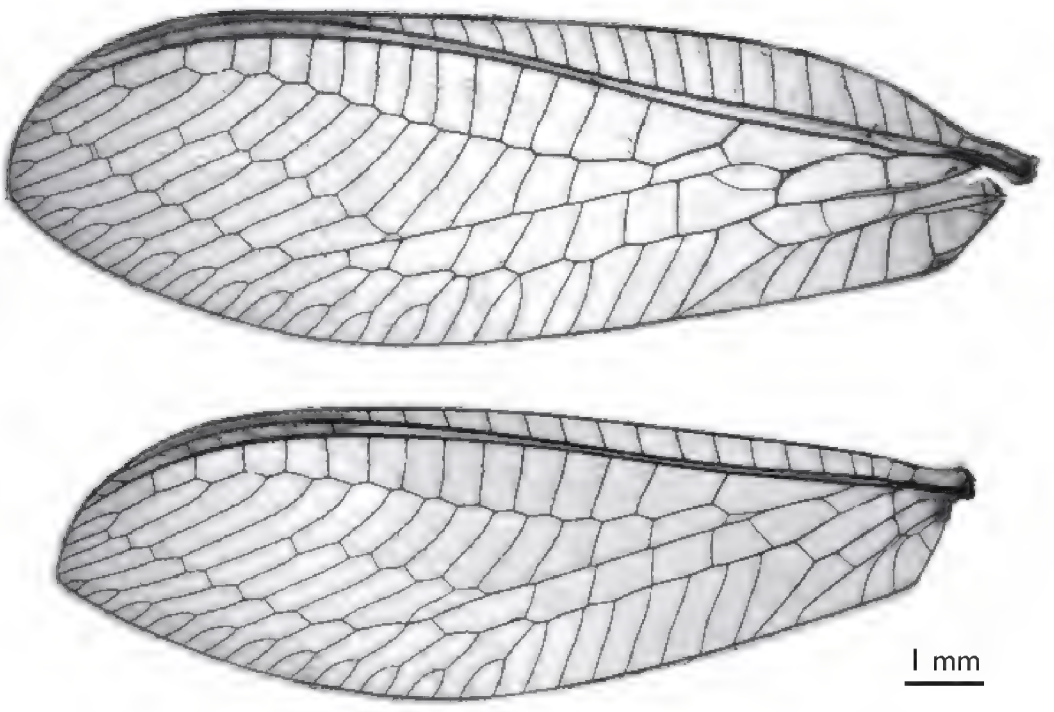

Figure 30. *Chrysopodes* (*Neosuarius*) *krugii*: Forewing, hindwings (West Indies: Dominica).

rate, with convex ventral margins; length ~2.0–2.3 times greater than height (lateral view, excluding extension on ♂ T7); with relatively long setae. Pleural region P6 with sparse setae. Sternite 6: roughly quadrate, with dorsal margins relatively straight; length ~0.9–1.1× height, with long, straight setae. Spiracles oval, not enlarged, ~0.06 mm long; atria not enlarged.

Male (Figs 31, 32): T8 rounded (lateral view), with setose ventrolateral extension reaching below spiracle. Left, right T9+ectoproct fused dorsally, without dorsal suture or invagination; distal edge straight vertically, bearing vertical field of dense, robust setae; apodeme on ventral margin heavy, thick, rounded anteriorly, without dorsal arm, with small, rounded ventral arm diverging slightly anterior to distal terminus of apodeme. Callus cerci oblong (0.18–0.21 mm tall, 0.10–0.14 mm wide), with 33–35 trichobothria. S8+9: length ~1.5× proximal height, ~2.3× mesal height, ~7–8× distal height; ventral margin straight, without knob, invagination or apodeme; basal margin straight; dorsal margin relatively straight, tapering to blunt, shallow tip; terminus with eversible membranous pouch or fold, basal part of membrane with large patch of gonocristae. Subanal plate distinct, well sclerotized, with dense, robust setae. Gonarcus arched, well-sclerotized, closely attached to T9+ectoproct via short, folded subanal membrane. Gonarcal bridge broad, flat (ventral view); apodemes extending from distal margins of bridge, not greatly flared distally; span of gonarcus near arch ~0.37–0.39 mm, distance between gonarcal apodemes distally ~0.48–0.51 mm. Gonarcal apodemes smooth, scalloped, rounded. Mediuncus with tapered, curved, cone-shape, broadly attached to gonarcal bridge basally, with pair of stout, dorsal rods gently curving outward from frontal edge of gonarcal bridge along almost full length of mediuncal dorsal surface; terminus tapering to blunt, ventrally projecting beak; dorsum rounded, with dense covering of microsetae; membrane below mediuncus flat, straight, with ~3 pairs of very small gonosetae. Gonosaccus large, delicate, with-

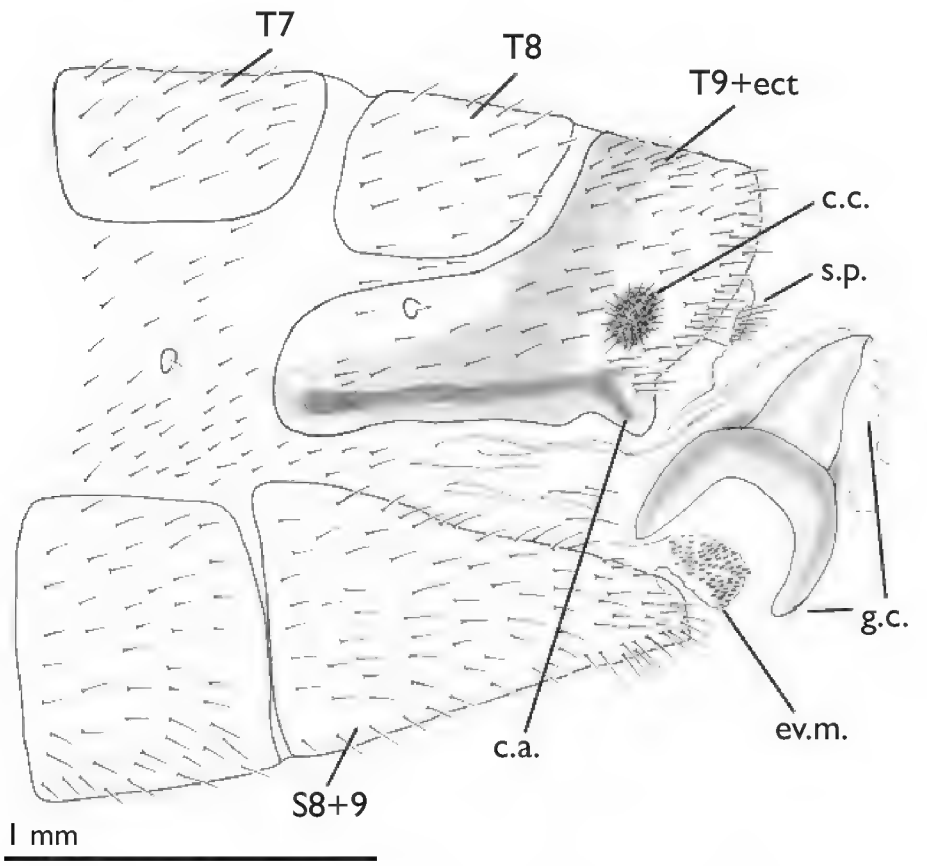

Figure 31. *Chrysopodes* (*Neosuarius*) *krugii*: Male terminus, lateral (membrane at tip of S8+9 expanded). **c.a.** caudal arm of apodeme on T9+ectoproct **c.c.** callus cerci **ev.m.** eversible membrane **g.c.** gonarcal complex **s.p.** setose subrectal plate **S8+9** fused eighth and ninth sternites **T7** seventh sternite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct.

out gonosetae or much structure. Hypandrium internum rounded, with slender arms; comes small, elongate, curved.

Female (Figs 33–35): Tergite 8: depth of fully sclerotized portion less that one-half length of sclerite; depth of less sclerotized ventral extension more than length of sclerite, with fairly long, slender setae. Ninth tergite+ectoproct (lateral view) tilted, ventral margin extending ~one half distance beneath T8; middle of proximal margin slightly bulged. Callus cerci slightly taller than broad (0.14–0.17 mm tall, 0.11–0.12 mm wide), with ~34–36 trichobothria. Gonapophyses laterales slightly > ½ length of T9+ectoproct; ~2.7–2.9× taller than wide, rounded dorsally, slightly more truncate ventrally, orientated posteroventrally (~52° angle from midline); with setae slightly smaller than those on T9+ectoproct. Seventh sternite: length ~1.5–1.6× height of proximal margin (lateral view); dorsal margin sloping slightly throughout, abruptly at terminus; distal margin somewhat convex, with long, slender setae. Subgenitale relatively narrow, with short neck, small bilobed process; base thick, folded membrane, attached to S7 via leathery, folded, slightly invaginated membrane. Pair of large, bulbous bursal glands with elongate, narrow ducts opening ventrolaterally on distal margin of bursa, without accessory ducts. Bursa fairly small, not extending laterally full width of segment, not reaching over entire spermatheca; dorsal membrane somewhat leathery, with numerous, small, transverse folds throughout, folds with rounded edges. Bursal duct long, but not more than twice length of abdomen; section arising from bursa ribbon-like, flat, bent, turned, with small transverse folds on surface; section arising

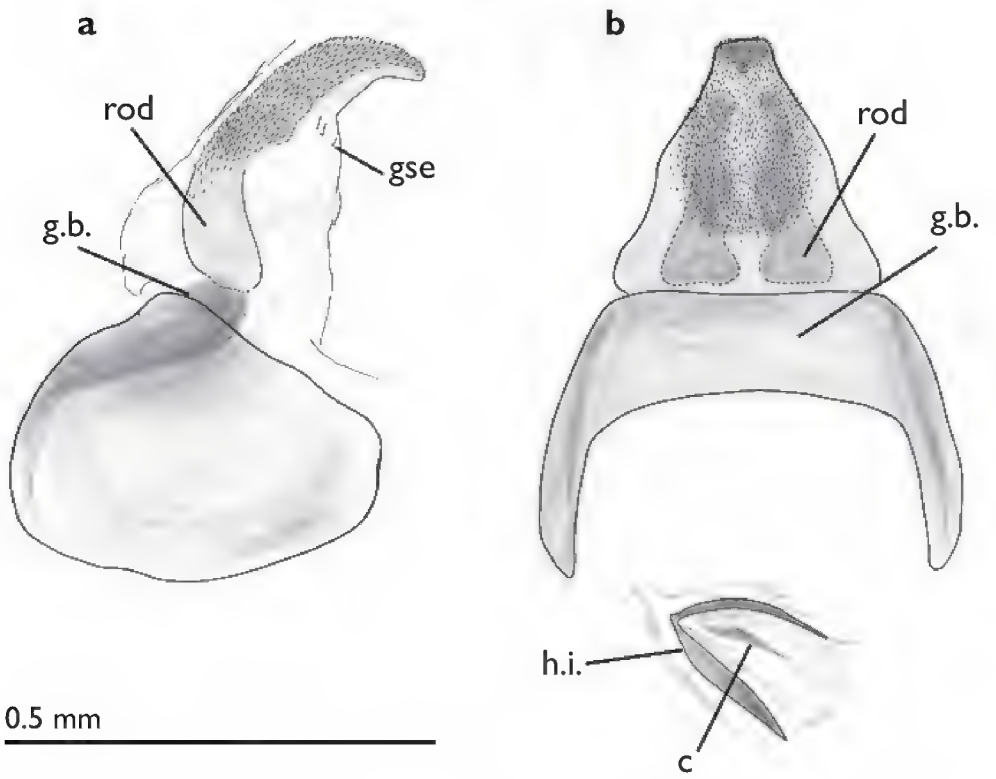

Figure 32. *Chrysopodes* (*Neosuarius*) *krugii*: Male genitalia. **(a)** gonarcus, lateral **(b)** gonarcus with hypandrium internum below (dorsal) **c** combes **g.b.** gonarcal ridge **gse** gonosetae **h.i.** hypandrium internum **rod** internal rod of mediuncus.

from spermatheca tubular, coiled, bent, with smooth surface. Spermatheca funnel-shaped, with large, mesal velum bending several times, tapering, merging into bursal duct; ~0.49–0.50 mm diameter, length to first bend, 0.50–0.83 mm; invagination elongate, tapered, extending through first sharp bend, short way through next section (total length 0.43–0.60 mm). Spermathecal duct long (~2.4 mm), narrow, arising slightly to left on dorsum of spermatheca, forming complete loop within subgenitale, second loop near spermatheca, U-bend after second loop; basal ½ sclerotized, brownish; distal ½ brushy, pale, becoming enlarged distally. Colleterial gland elongate, narrow, extending into middle of sixth segment, with slightly grainy texture; no reservoir or accessory glands found. Transverse sclerotization relatively flat, ellipsoid, with longitudinal (to the body) rows of setae, located mesally on gonapophyses laterales; membrane internal to transverse sclerotization without setae, two pairs of short setae slightly distal (exterior).

Larvae. Unknown.

Eggs. Unknown.

Biology. Unknown. Adults were collected in all months.

Type material. ***Chrysopa krugii* Kolbe.** A single type (examined) is in the ZMB; I consider it to be the LECTOTYPE (present designation). Its labels read" (1) "Portorico / Consul Krug" [green, hand written]; (2) "38. Chrysopa / Krugii / Kolbe *" [white, hand written]; (3) "1714" [white, hand written]; (4) "Type" [red, printed]; (5) "Chrysopa (Suarius) / collaris / ♀ Schneider 1851 / det. P. Adams 1977" [white, hand printed]; (6) "LECTOTYPE / *Chrysopa krugii* / Schneider, 1851; / des. C. Tauber 09" [red].

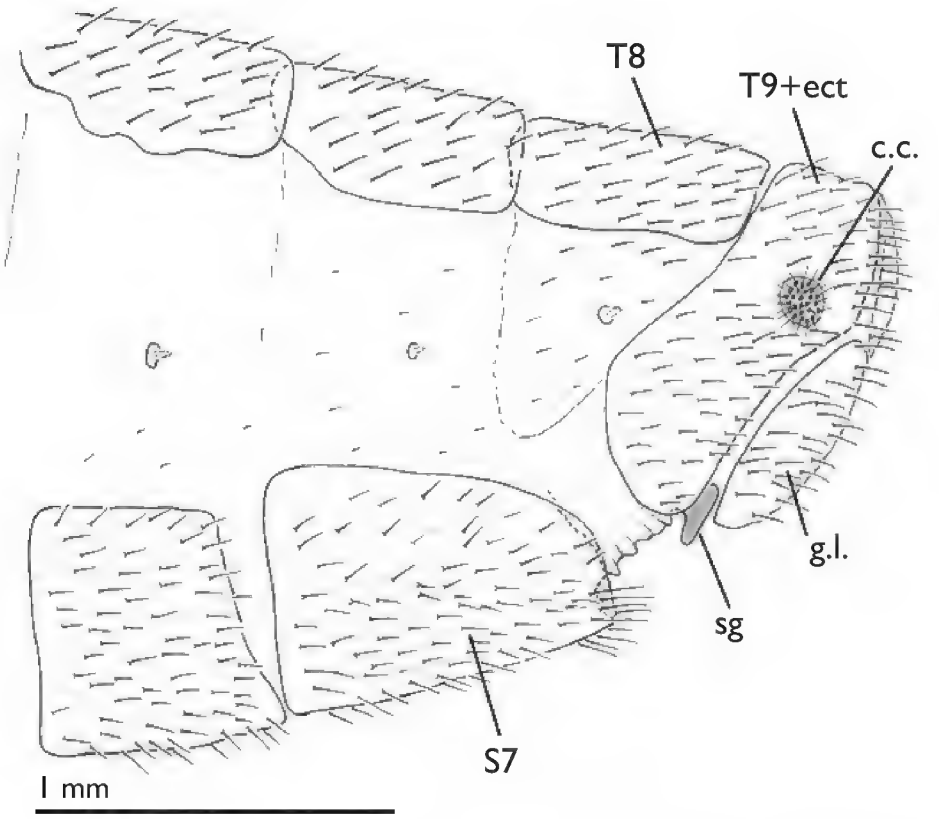

Figure 33. *Chrysopodes* (*Neosuarius*) *krugii*: Female terminus, exterior, lateral. **c.c.** callus cerci **g.l.** gonapophysis lateralis **sg** subgenitale **S7** seventh sternite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct. Setose subrectal plate not shown.

Specimens examined (in addition to type above). **WEST INDIES. ANGUILLA. Anguilla:** Rey Hill, 18°12'20"N, 63°03'00"W, III/30/1992, collrs. W. E. Steiner & J. M. Swearingen (1F, USNM). **ANTIGUA.** Coolidge, IV/1/1964, O. S. Flint (1F, USNM). **DOMINICA.** Macoucheri, II/1/1965, J. F. G. Clark, Thelma M. Clark, Bredin-Archbold Smithsonian Bio. Surv. Dominica (3M, 3F, USNM); W. I., Macoucheri, III/5/1965, W. W. Wirth, at light, Bredin-Archbold Smithsonian Bio. Surv. Dominica (1M, 1F, USNM); Grande Savane, VI/7/1964, O. S. Flint, Jr. (2F, USNM), D. R. Davis, VI/11/1965 (3F, USNM); Cabrit Swamp, VI/18/1964, O. S. Flint, Jr. (3M, USNM), X/20/1966, E. L. Todd (1F, USNM); II/23/1965, J. F. G. Clark, Thelma M. Clark, Bredin-Archbold Smithsonian Bio. Surv. Dominica (1F, USNM); Clarke Hall II/11/1964, Dale F. Bray, (1M, USNM), IV/22/1964, V/5/1964, V/8/1964, O. S. Flint, Jr. (2M, 1F, USNM), I/16/1965, J. F. G. Clark, Thelma M. Clark, Bredin-Archbold Smithsonian Bio. Surv. Dominica (1F, USNM); Clark Hall Est., VII/19/1965, VIII/12/1965, D. M. Anderson, (2M, USNM); S. Chiltern, XII/8–10/1964, P. J. Spangler, Bredin-Archbold Smithsonian Bio. Surv. Dominica (1M, USNM); St. Paul Parish, Mt. Joy, VI/10/1992, K. Arnold & students (1F, TAMU); St. Paul, Springfield Estate, 2.5 km ENE Canefield, 15–21N, 61–22W, 450m, VI/11–18/1991, J. E. Rawlins, S. A. Thompson, Carnegie Museum, Specimen Numbers CMNH-391,956, CMNH-367,550, Chrysopodes sp., det. Penny, 97 (1M, CMNH), Undetermined Chrysopini, det. Penny, 97 (1F, CMNH). **GUADELOUPE. Basse Terre:** Prise d'Eau, Basse Terre E., VI/1–15 /1977, A. Villiers (1M, MNHN); Anse a l'Eau, VI/1–15/1977, A. Villiers (1F, MNHN). **NETHERLANDS ANTILLES. Curaçao:** Boca Sta. Cruz, II/14/1987, W. E. Steiner & J.

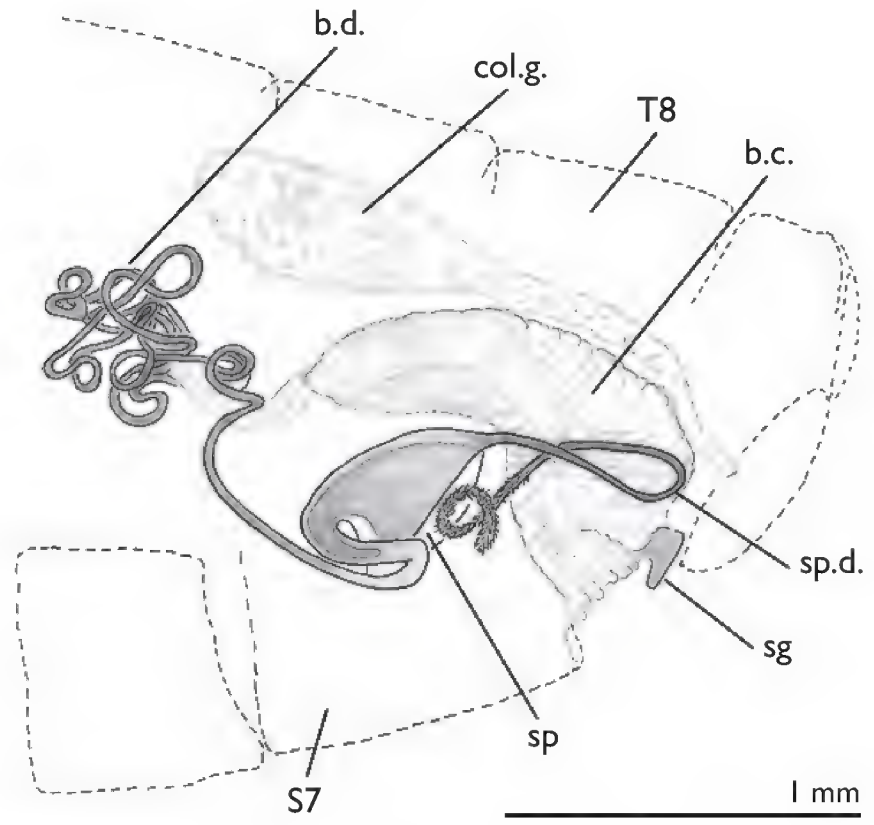

Figure 34. *Chrysopodes* (*Neosuarius*) *krugii*: Female terminus, interior, lateral. **b.c.** bursa copulatrix **b.d.** bursal duct **col.g.** colleterial gland **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct **S7** seventh sternite **T8** eighth tergite. Bursal glands not shown.

M. Swearingen, at black light in mangrove inlet and desert scrub (3M, 2F, USNM). **PUERTO RICO. Puerto Rico Island:** Maricao, Bosque Estatal de Maricao, 3.3 km SW Maricao, 18-09-39N, 67-00-05W, forest, 550m, VI/10–11/1996, J. Rawlins, C. Young, R. Davidson, W. Zanol, S. Thompson, M. Klingler (2M, 2F, CMNH, Specimen Numbers CMNM-63,041, CMNH-62,992, CMNH-63,304, 63,070); San Juan U. S. Quarantine Station, XI/19-XII/29/1962, Lite trap, J. E. Porter (1F, OSU); San Juan COC Field Stn., XI/29-XII/26/1962, Light trap, J. E. Porter (1F, OSU). **U. S. VIRGIN ISLANDS. St. Croix:** Christiansted, XI/20–26/1985, G. E. Bohart (1F, USU).

Known distribution. Puerto Rico and the Leeward Islands of the West Indies [Antigua, Anguilla, Dominica, Guadeloupe, St. Croix (U.S. Virgin Islands), and Curaçao (Netherlands Antilles)].

Variation. There is variation in the extent of the facial and prothoracic red coloration that typifies this species (Figs 28, 29). The specimens from the Leeward Islands tend to have pronounced red prothoracic stripes, and none of the frontal or clypeal markings of *C.* (*N.*) *collaris*. In contrast, the Puerto Rican *C.* (*N.*) *krugii* either lack red prothoracic stripes, or they have very subtle, diffuse stripes. It is noteworthy that some of these Puerto Rican *C.* (*N.*) *krugii* females differ more from *C.* (*N.*) *collaris* in their genitalia than do those from Dominica, Antigua or Curaçao. Specifically, their bursal ducts are shorter and the proportion of the flat, ribbon-like portion of the bursal duct is much smaller, relative to the cylindrical portion.

One male and two female specimens from Puerto Rico (with faded body color) have interesting combinations of traits: In the male (3.3 km SW of Maracao), the mediuncus and sclerotized rods extend from the frontal margin of the gonarcal arch and the ventral apodeme is straight, with a single (very small) ventral process, as in *C.*

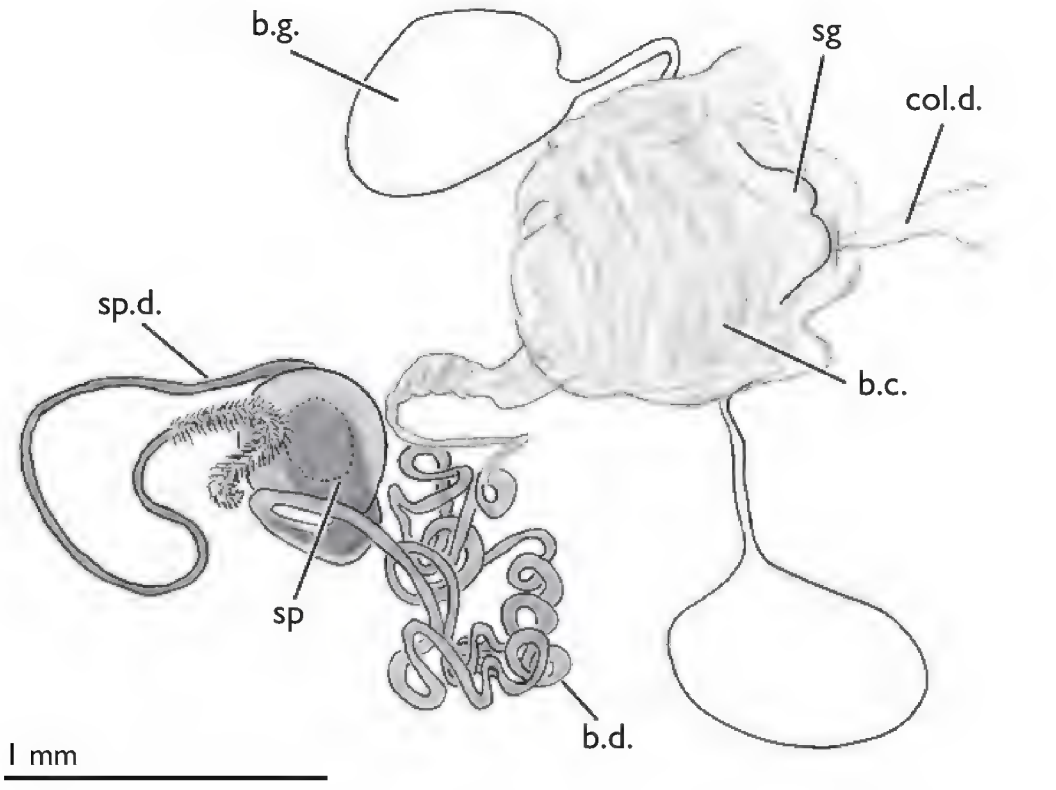

Figure 35. *Chrysopodes* (*Neosuarius*) *krugii*: Female genitalia, ventral (spermathecal complex separated from bursa). **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **col.d.** duct from colleterial gland **sp** spermatheca **sp.d.** spermathecal duct.

krugii; however, the sclerotized rods are not closely attached to the gonarcus and the tip of S9 is heavily setose, as in *C.* (*N.*) *collaris*. In one female (San Juan, COC Field Stn., Nov. 29-Dec. 26, 1962, John E. Porter, light trap) there is a flat, ribbon-like portion of the bursal duct that is long, folded and coiled [as in *C.* (*N.*) *collaris*]; however most of this section of the duct appears to be independent of the true bursal duct; it loops off from the smooth-surfaced, tubular section of the duct that connects with the spermatheca. In the other female (San Juan U. S. Quarantine Station, Nov. 19-Dec. 26, 1962, J. E. Porter, Lite trap), the bursal duct is short, but largely composed of flat, folded tissue; the smooth-surfaced, tubular section is short and tightly coiled.

Chrysopodes (Neosuarius) oswaldi Penny, 2002

Figs 11d, 12d, 36–39

Chrysopodes (*Neosuarius*) *oswaldi* Penny, 2002: 224 [CAS, Holotype (by original designation): "10 mi. S. Rincon de Osa / Puntarenas Proince [Sic!], Costa / Rica, 4–12. III.69 / J. K. Sheldon Field #/."]. Oswald 2007 [catalog listing].

Diagnosis. *Chrysopodes* (*Neosuarius*) *oswaldi* adults most closely resemble those of *C.* (*N.*) *collaris*. They can be recognized by the distinctive head markings (Figs 11d, 12d). There is a deep red, Y-shaped mark on the vertex above the antennae, and on the face is a pair of red, concave marks below the toruli. The dorsal surface of the scapes has a broad, red, longitudinal stripe; the frons is white; and the entire gena is red. The wings

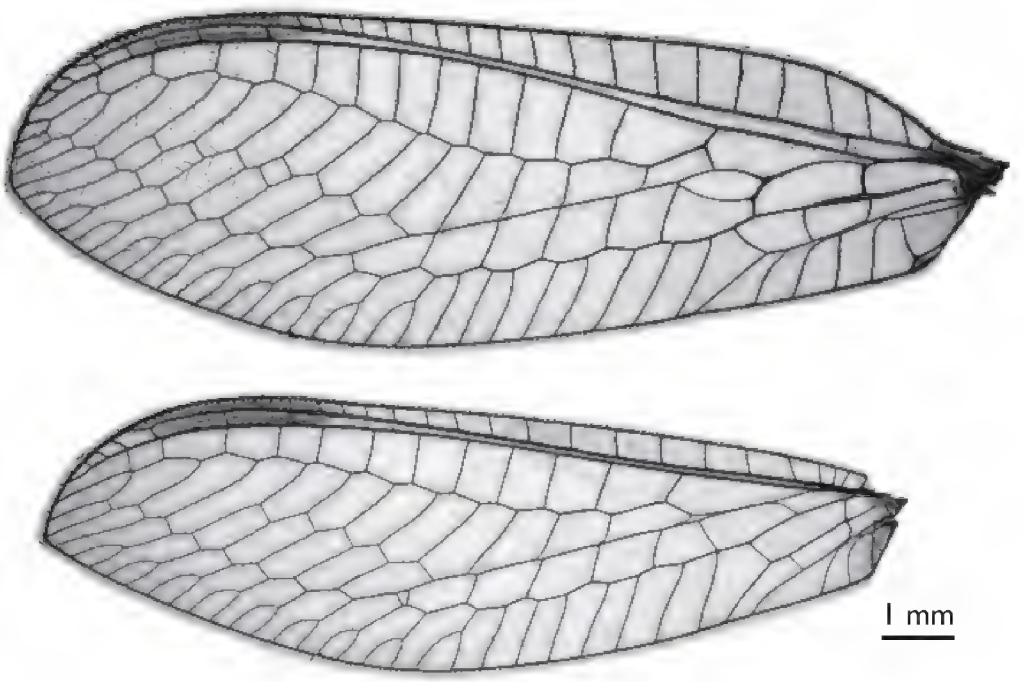

Figure 36. *Chrysopodes* (*Neosuarius*) *oswaldi*: Forewing, hindwing (Panama).

are broader and more rounded distally than those of *C.* (*N.*) *collaris*; the forewing venation is mostly green, but the costal veinlets, the bases of radial crossveins #1–8, and the icu crossveins are dark brown.

In the male, the arms and bridge of the gonarcus extend widely. The triangular arcessus is supported basally by a pair of dorsal rods that arise from the front of the gonarcal bridge, not from beneath it. The arcessus terminates in a setose, hook-shaped apical beak (Fig. 38). The female terminalia are almost identical to those of *C.* (*N.*) *collaris*; i.e., they are typified by a relatively wide, funnel-shaped spermatheca with a broad ventral invagination and an elongate, curved velum (Fig. 39). The bursa is large and leathery; the spermathecal duct is long and coiled; and the bursal duct is very long and narrow.

Description. *Head* (Figs 11d, 12d): Width (frontal, including eyes) 1.4 - 1.7 mm; ratio, head : eye width = 2.2–2.5:1; distance (straight-line) between tentorial pits 0.49–0.55 mm. Distance between antennae ~0.11–0.14 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.40–0.49 mm; clypeus ~0.24–0.29 mm long. Antenna ~0.61× length of forewing (8.5 mm; n=1). Vertex slightly raised, flat, rounded throughout, with very small, upward fold posteriorly; surface of vertex smooth, without setae. Frons relatively flat, unsculptured; surface smooth, shiny throughout. Clypeus unsculptured; surface smooth, mostly flat, very slightly raised in middle. Labrum flat; surface smooth; distal margin straight.

Head coloration: Head cream with deep red marks; vertex with single, V-shaped mark extending along posteromesal margin of toruli, part way around lateral edge of vertex; torulus cream colored, unmarked; posterolateral region unmarked. Genae red throughout; frons creamy white, with pair of deep red, scalloped marks below toruli; clypeus creamy white to amber distally. Scapes creamy white, with broad, longitudinal, red, mesal stripe on dorsum, unmarked frontally; pedicel cream, with brown

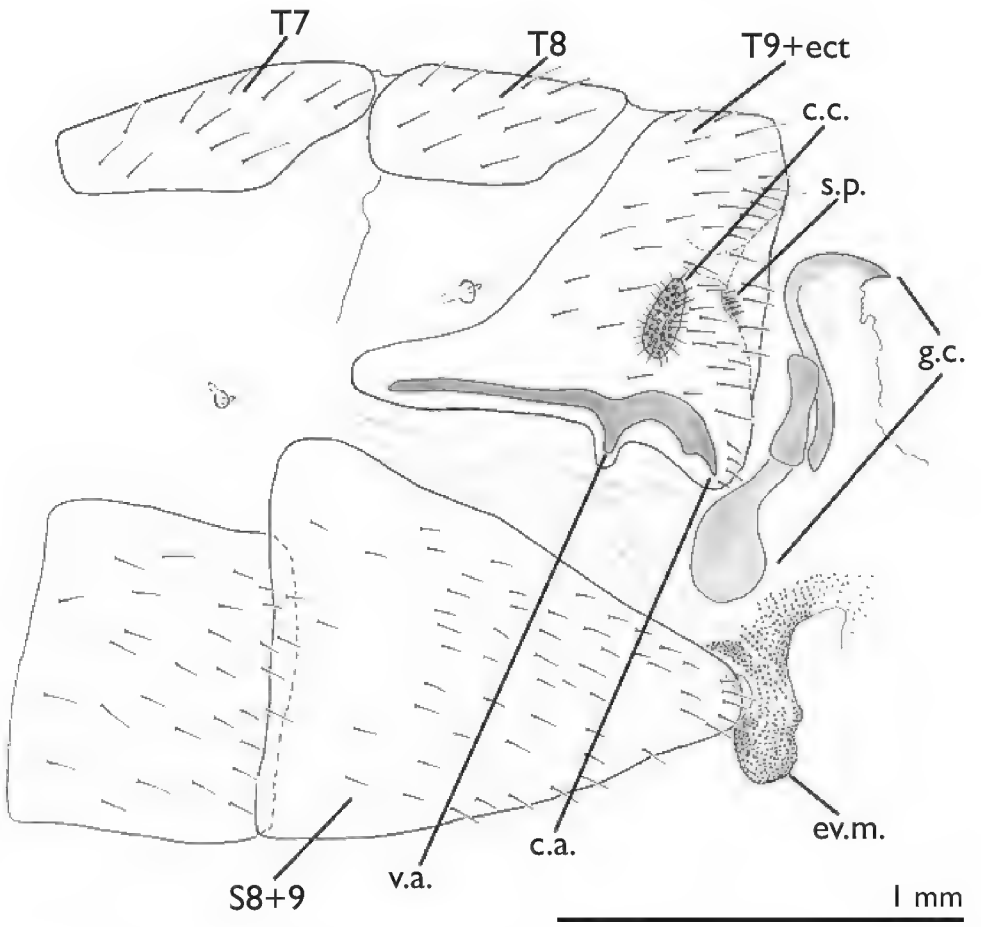

Figure 37. *Chrysopodes* (*Neosuarius*) *oswaldi*: Male terminus, lateral (membrane at tip of S8+9 expanded). **c.a.** caudal arm of apodeme on T9+ectoproct **c.c.** callus cerci **ev.m.** eversible membrane **g.c.** gonarcal complex **s.p.** setose subrectal plate **S8+9** fused eighth and ninth sternites **T7** seventh tergite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct **v.a.** ventral arm of apodeme on T9+ectoproct.

with small red horizontal stipe laterally; flagellum creamy white throughout. Maxillary palp: segments 3–5 amber, with brown dorsal mark; basal two segments cream. Labial palp with terminal segment amber to brown, basal segments cream. Venter cream-colored, unmarked.

Thorax (Fig. 11d): Pronotum wider than long: ~0.75–1.05 mm long; ~1.16–1.40 mm wide; cream (probably green in life), unmarked; numerous thin, pale setae (longest ~0.18–0.23 mm long). Meso-, metanota cream (probably green in life), probably with middorsal yellow stripe, unmarked; setae thin, pale. Pleural areas cream colored, without markings. Legs cream without markings, setae golden. Tarsal claws amber, long, narrow, with broad cleft, small base with dark mark.

Wings (Fig. 36): Forewing 12.7–14.8 mm long, 4.1–4.8 mm wide; L:W (midpoint) ratio, 3.0–3.1; width greatest near midpoint, tapering at basal 1/4th and after distal 3/4th of wing; costal margin fairly straight, sloping gradually at base; apex broad, rounded. Media (before and after furcation of M1 and M2), ma, base of Cu1 (above icu1) crassate. Costal area slightly enlarged; height of tallest costal cell (#5–7) = 0.18–0.19× width of wing, 4.5–6.4× length of first costal vein. Subcosta, radius sinuate; most subcostal veinlets, radial crossveins straight. Twelve closed radial cells (between R and Rs), height of tallest radial cell 1.5–2.1× width; other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four b' cells; First intramedian cell ovate, 0.6–0.9× width of third medial cell; inner row of five to seven

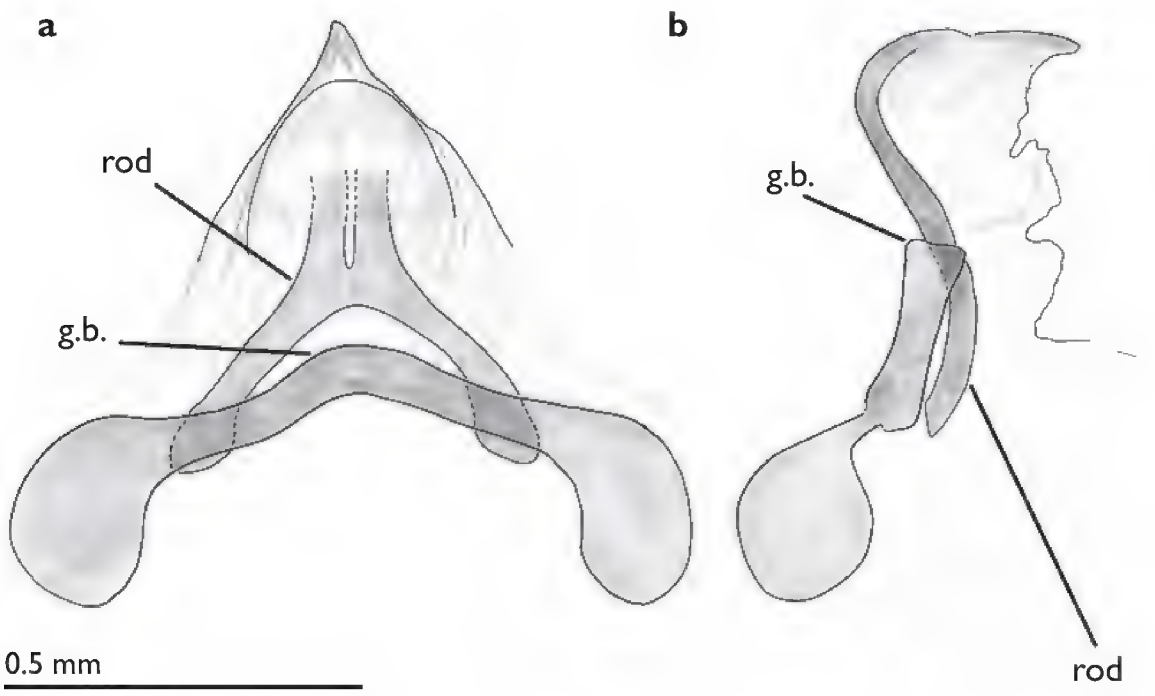

Figure 38. *Chrysopodes* (*Neosuarius*) *oswaldi*: Male genitalia. **(a)** gonarcus, dorsal **(b)** gonarcus, lateral (hypandrium internum, not shown). **g.b.** gonarcal bridge **rod** internal rod of mediuncus.

gradate veins; eight to ten outer gradate veins; both rows regularly stepped, parallel to each other distally. Second cell beneath Rs with i.g. at base = 1.5–1.6 mm tall, 2.6–2.9× width; third cell = 1.4–1.5 mm tall, 2.6–2.9× width. Second gradate cell 1.4–1.5 mm tall, 3.1–3.2× width; third gradate cell 1.4–1.5 mm tall, 3.0–3.2× width. Length of second cell beneath Rs with i.g. at base = 1.1× length of second gradate cell. Three intracubital cells; distal one open, icu1, icu2 each shorter than icu3; icu1 slightly shorter than icu2. Vein 1A forked. Hindwing narrow, with tip angulate; 12.1–13.1 mm long, 3.7–4.0 mm wide. Eleven to twelve radial crossveins; four to five inner gradates; seven to eight outer gradate veins; three b cells, plus small t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline; stigma tinged with brown. Longitudinal veins green, unmarked; costal veinlets #5–10 brownish; tip of im1 lower vein, rs-m crossvein brown or partially brown; gradates with tinge of brown; base of r crossveins #1–8, icu crossvein #1 dark brown.

Abdomen (Fig. 37): Tergites 6, 7: roughly quadrate, with convex ventral margins, straight basal margins, rounded distal margins; length 2.4–2.7 times greater than height (lateral view); with sparse, long, thin setae. Pleural region P7 with very few, medium-length, thin, setae. Sternite 6 quadrate, with dorsal margin relatively straight; length 0.90–0.95× height; with long, slender setae. Spiracles oval, not enlarged (~0. 07 mm diameter); atria not enlarged.

Male (Figs 37, 38): T8 rounded anteriorly, posteriorly (lateral view), with setose ventrolateral extension reaching below spiracle. Left, right T9+ectoproct fused dorsally; terminal edge straight vertically, bearing long, thin setae; with distinct apodeme along ventral margin, apodeme straight basally, with knob and ventral arm subapically, caudal arm bent downward, with arrow-like apical process; area around callus cerci weakly sclerotized. Callus cerci oblong (0.22–0.28 mm tall, 0.15–0.17

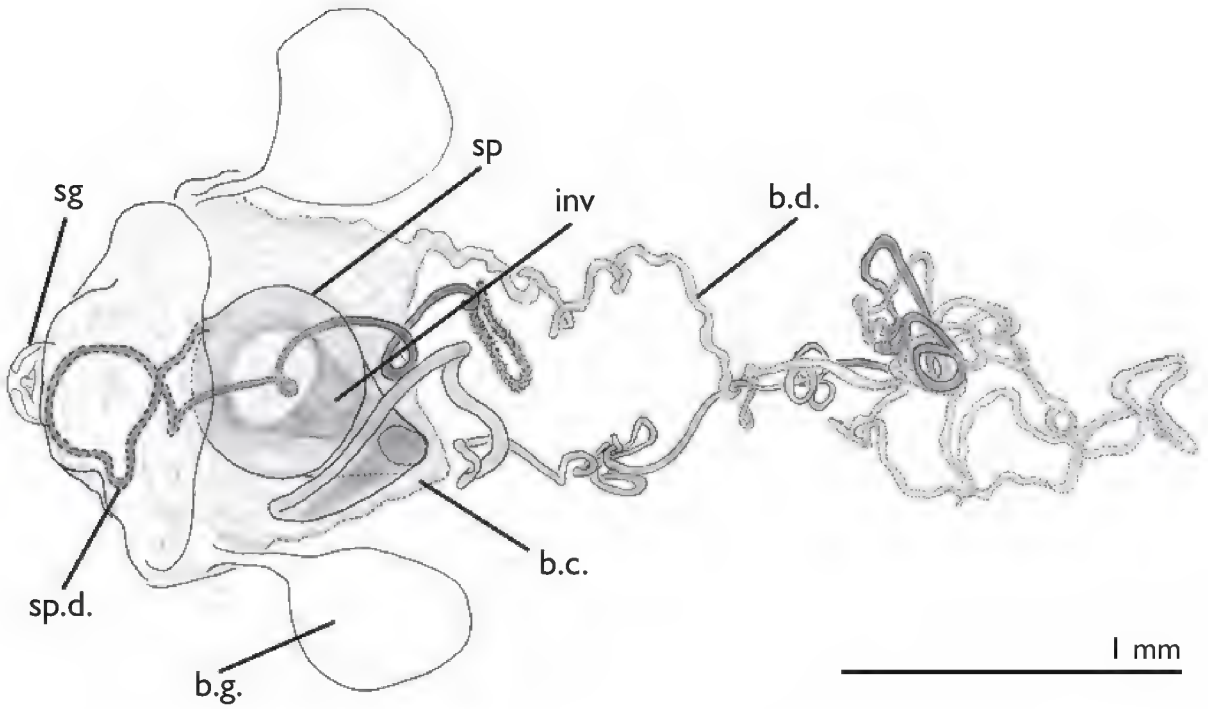

Figure 39. *Chrysopodes* (*Neosuarius*) *oswaldi*: Female genitalia, ventral. **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **inv** invagination **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

mm wide), with ~30 short, thin trichobothria. S8+9 length ~1.25× proximal height; dorsal margin sloping throughout; ventral margin slightly bent upward, without knob, invagination, or apodeme; terminus short, blunt, with distal margin bearing long, heavy setae on somewhat enlarged setal bases, heavy membrane covered with dense field of small gonocristae. Subanal plate distinct, with dense, robust setae. Gonarcus broadly arcuate, tightly attached to T9+ectoproct dorsally via short, folded subanal membrane; broadly V-shaped in frontal view, straight in lateral view; with apodemes attached distally on bridge; bridge smooth, rod-like; span of gonarcus near arch ~0.60 mm, distance between gonarcal apodemes distally ~1.0 mm. Gonarcal apodemes round, smooth. Mediuncus membranous basally, with pair of robust, sclerotized rods internally, extending from below distal margin of gonarcal bridge, curving upward, approaching each other, fading distally; apical section of mediuncus rounded, dome-like dorsally; terminus bent perpendicularly into blunt, ventrally projecting beak; dorsal surface with dense covering of microsetae; membrane below mediuncus rounded, gathered upward, apparently with large, dense field of robust gonocristae. Gonosaccus beneath mediuncus delicate, thin, without gonosetae or much structure. Hypandrium internum expanded in dorsal view, flat in lateral view, with arms rounded, meeting at apex in smooth, round surface, with narrow, hook-like combs, not extending beyond arms.

Female (Fig. 39): Very similar to *C.* (*N.*) *collaris* (see Figs 18, 19). Callus cerci very slightly taller than broad (0.13 mm tall, 0.12 mm wide), with approximately 24 trichobothria. Gonapophyses laterales fairly tall, approximately 2× taller than wide, rounded dorsally, ventrally. Subgenitale broad, thick, fleshy, with short, broad neck, very small ventrally projecting process; base with thick, textured, folded membrane, attached to S7 via leathery, textured, invaginated membrane. Pair of large, bulbous bursal glands, with elongate ducts opening on dorsolateral margin

of bursa, without accessory ducts. Bursa fairly large, extending laterally full width of segment, posteriorly beyond spermatheca; membrane leathery basally, with numerous, small, transverse folds, bursal section becoming thinner distally, folds becoming longitudinal. Bursal duct elongate, much longer than length of abdomen); section arising from bursa flat, fluted, becoming flat, ribbon-like, coiled, surface with small transverse folds (bursal section somewhat longer than 1/2 length of bursal duct); section arising from spermatheca tubular, with smooth surface, initially straight, becoming coiled, bent (spermathecal section slightly less than 1/2 length of bursal duct). Spermatheca funnel-shaped, with large mesal, invaginated velum that makes two full bends, tapers into bursal duct; ~0.58 mm diameter, ~0.53 mm in length to first bend; invagination elongate, tapered, extending through first two bends, perhaps into bursal duct, as internal duct (total length ~2 mm). Spermathecal duct ~4 mm long, narrow, arising from posterior surface of spermatheca slightly on left side, with full coil within subgenitale; basal 1/3rd sclerotized, brownish; distal 2/3rd lightly sclerotized, brushy, very pale (only visible under compound microscope), becoming enlarged distally. Colleterial gland relatively short, bulbous, probably not extending into seventh segment, with slightly grainy texture; no reservoir or accessory glands found. Transverse sclerotization well-formed, curved, ellipsoid plate, located ventrally within gonapophyses laterales, with longitudinal (to the body) rows of setae.

Larvae. Unknown.

Eggs. Unknown.

Biology. Unknown. The only known adults were collected in January, March, August and December.

Type material. ***Chrysopodes (Neosuarius) oswaldi* Penny.** The unique type (examined), the Holotype (by original designation), is in the CAS; its labels read: (1) "10mi. S. Rincon de Osa / Puntarenas Province, Costa / Rica, 4–12.III.69 / J. K. Sheldon Field #"; (2) "HOLOTYPE / Chrysopodes / oswaldi / det. Penny, '02" [red]. One pair of wings is attached to a tab below the labels.

Specimens examined (in addition to the type specimen above). **BELIZE.** Twin Cays, I/5/89, red mangrove (1M, USNM). **COSTA RICA. Puntarenas:** Rio Barranca, 11 km. E. Puntarenas, VIII/7/1964, G. C. Eickwort (1M, KU). **PANAMA.** XII/1935, No. 14,735 (1F, USNM).

Known distribution. Central America (Belize, Costa Rica, Panama).

Chrysopodes (Neosuarius) – flavescens species-group

Six *Chrysopodes* (*Neosuarius*) species from the western regions of South America form a natural group (the *flavescens* group); this group includes *Chrysopodes* (*N.*) *escomeli, C.* (*N.*) *flavescens, C.* (*N.*) *porterinus,* and three species endemic to Galápagos Islands [*C.* (*N.*) *nigricubitus, C.* (*N.*) *nigripilosus, C.* (*N.*) *pecki*]. The following characteristics distinguish them from the *collaris*-group:

1 Body (dorsal): primary color cream or tan, with brown or brownish markings
2 Head: cream-colored to tan, with brown markings; frons with pair of brown spots below toruli
3 Male: abdomen with terminal segments (S8+9, sometimes T9+ectoproct) having sclerotized transverse bands and invaginated re-enforcements
4 Male: tip of S8+9 with delicate, eversible membrane lacking robust gonocristae; membrane sometimes modified into paired eversible pouches (Galápagos species)
5 Female: spermatheca tubular, opening to the bursa copulatrix via an elongate dorsal slit
6 Female: spermathecal duct relatively short (or weakly sclerotized)
7 Female: Bursal duct apparently modified into a fluted, tightly folded structure below the bursa. [The origin of the fluted area below the bursa is not completely clear. I consider it to be an enlarged part of the bursal duct and treat it as such in the descriptions and on the figures. However, it could be part of the bursa copulatrix, in which case the bursal duct would be greatly reduced.]
8 Female: bursal glands sometimes with elongate, slender accessory ducts

Chrysopodes (Neosuarius) escomeli **(Navás, 1922)**
Figs 40a, 41a, 42–48a

Chrysopa escomeli Navás, 1921a [1922]: 259 [MNHN, Lectotype (by previous designation): "Pérou. Env. d'Aréquipa, Dr. Escomel, 1912"]. Navás 1932a: 57 [biological note]; Navás 1933b: 195 [re-description, new specimens from type locality]; Penny 1977: 17 [species list]; Legrand et al. 2008 [2009]: 135 [lectotype designation, taxonomy].

Suarius escomeli (Navás). Núñez Z., E. 1989: 72 [species list, Peru].

Chrysopodes (*Neosuarius*) *escomeli* (Navás). Adams and Penny 1985 [1987]: 436 [transfer to *Chrysopodes*; biological note]; Adams and Penny 1986: 122 [biological note]; Brooks and Barnard 1990: 272 [species list]; Oswald 2007 [catalog listing, nomenclature; reference to original description and date in error].

Diagnosis. *Chrysopodes* (*N.*) *escomeli* is one of several Andean species (including *C.* (*N.*) *flavescens, porterinus* and *figuralis*) that have robust, waxy bodies; like *C.* (*N.*) *porterinus* and *C.* (*N.*) *flavescens, C.* (*N.*) *escomeli* adults have more or less darkly marked bodies. *C.* (*N.*) *escomeli* can often be separated from the other two species by their long wings (usually 16–17 mm) (Fig. 42), the veins of which are alternately light and dark throughout. Unlike in *C.* (*N.*) *porterinus*, the antennae of *C.* (*N.*) *escomeli* are cream-colored to tan, not dark brown, and the dorsal surface of the scapes has a brown stripe on the mesal margin and a darker, sublateral stripe that extends up from the torulus through the pedicel (Figs 40a, 41a).

The male abdomen, with its heavy dorsal and ventral apodemes on T9+ectoproct and S8+9, internal apodeme on the ventral midline of S8+9, and compact genitalia, is

Figure 40. *Chrysopodes* (*Neosuarius*) *flavescens*-group: Head, prothorax, dorsum. **(a)** *C.* (*N.*) *escomeli* **(b)** *C.* (*N.*) *flavescens* **(c)** *C.* (*N.*) *nigricubitus* **(d)** *C.* (*N.*) *nigripilosus* **(e)** *C.* (*N.*) *pecki* **(f)** *C.* (*N.*) *porterinus.*

particularly distinctive (Figs 43, 44). However, only a few, subtle differences distinguish the *C.* (*N.*) *escomeli* female genitalia from those of *C.* (*N.*) *flavescens* and *porterinus*. In *C.* (*N.*) *escomeli* (unlike the other two species), the tubular spermatheca has two very abrupt curves which produce a pronounced loop, but not a bean-shaped enlargement (Fig. 48a). As in the other two species, the spermathecal duct extends into and then out of the subgenitale, but in *C.* (*N.*) *escomeli* the entire brushy portion appears unsclerotized and can only be seen with a compound microscope. In the other two species, at least part of the brushy section can usually be seen without a compound microscope.

Description. (All the available specimens were old and somewhat discolored.) *Head* (Figs 40a, 41a): Width (frontal, including eyes) 1.53 - 1.72 mm; ratio, head : eye width = 2.03–2.14:1; distance (straight-line) between tentorial pits 0.41–0.51 mm. Distance between antennae ~0.07–0.09 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.47–0.55 mm; clypeus ~0.23–0.31 mm long. Antenna 0.8–0.9× length of forewing (12.2–13.1 mm). Vertex slightly raised, flat throughout, with slight upward fold posteriorly; surface of vertex slightly grainy, without setae; area surrounding vertex smooth, without setae. Frons flat, unsculptured; surface smooth, shiny throughout. Clypeus flat, unsculptured, with smooth surface. Labrum flat; surface smooth; distal margin with very small cleft.

Head coloration: Head cream to tan; vertex with brown markings around frontal, lateral edges of raised area; brown around entire edge of dorsal torulus; torulus with

Figure 41. *Chrysopodes* (*Neosuarius*) *flavescens*-group: Head, frontal. **(a)** *C.* (*N.*) *escomeli* **(b)** *C.* (*N.*) *flavescens* **(c)** *C.* (*N.*) *nigricubitus* **(d)** *C.* (*N.*) *nigripilosus* **(e)** *C.* (*N.*) *pecki* **(f)** *C.* (*N.*) *porterinus*.

elongate brown stripe mesally; brown mark extending distally through mid-dorsal surface of scape and pedicel. Frontal torulus cream-colored; frons cream, with pair of ovate, dark brown to black marks below frontolateral margin of torulus; clypeus cream, with dark brown lateral margins. Genae cream, with large, dark brown longitudinal stripe. Scapes cream frontally, cream with two pairs of longitudinal brown stripes basally; pedicel cream with dorsolateral brown stripe; flagellum cream to amber basally, with brown setae, becoming amber distally. Maxillary, labial palp amber to brown. Mentum, stipes, galea mostly cream.

Thorax (Fig. 40a): Pronotum wider than long: ~0.68–0.98 mm long; ~1.07–1.25 mm wide; cream to tan, with brown, crooked mesal stripe, pair of brown, wiggly sublateral stripes (~0.10–0.15 mm wide), lateral margin brown anteriorly; numerous long, brown setae (longest ~0.20–0.31 mm long). Meso-, metanota brown, sublateral markings; sparce brown setae on mesonotum, sparce amber setae on metanotum. Pleuron cream, with brown markings. Legs cream without markings, except brown band distally around hind femur; tarsi amber-tinged. Tarsal claws amber, broadly curved with base very slightly expanded.

Wings (Fig. 42): Forewing 14.0–16.6 mm long, 4.2–5.2 mm wide; L:W ratio, 3.2–3.4; ratio maintained through midpoint and distal 3/4th of wing; width at basal 1/4th slightly narrower; costal margin sloping gradually at base, relatively straight thereafter; apex ovate. Base of Cu1 (above icu1) crassate. Costal area not enlarged; height of tallest costal cell (#5, 6) = 3.9–4.6× length of first costal vein, 0.18–0.20× width of wing. Subcosta, radius very slightly sinuate; most subcostal veinlets, radial cells straight. Ten closed radial cells (between R and Rs), height of tallest radial cell 1.1–1.3× width; other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four b' cells. First intramedian cell ovate, 0.6×

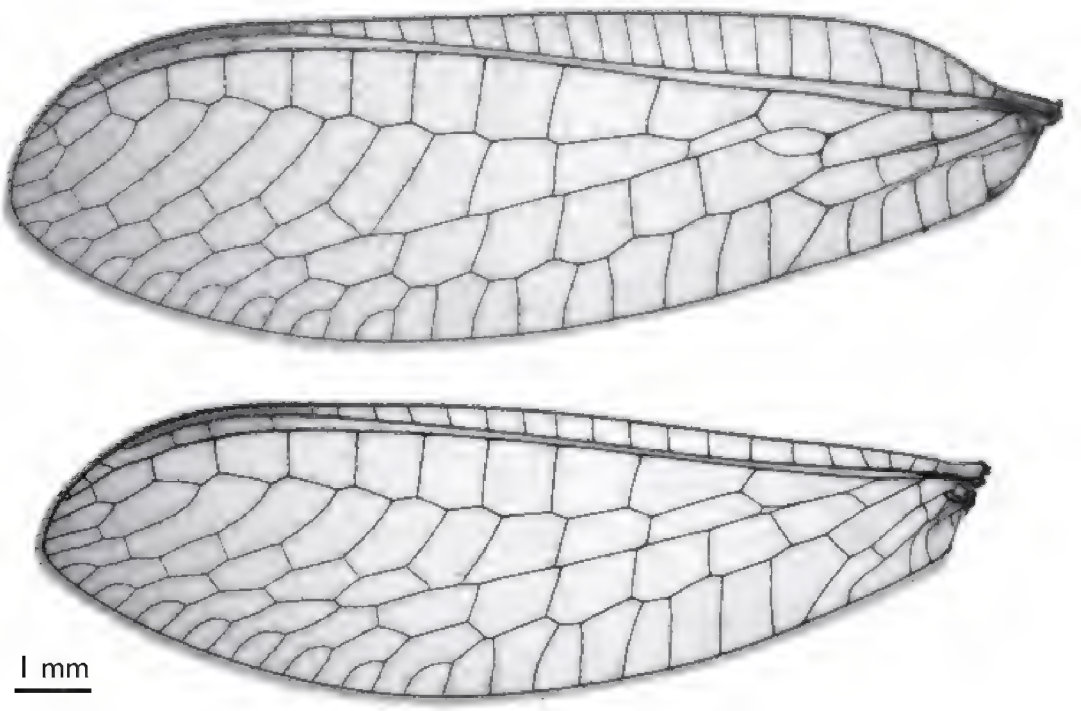

Figure 42. *Chrysopodes* (*Neosuarius*) *escomeli*: Forewing, hindwing (La Libertad, Peru).

width of third medial cell; inner row of three to four gradate veins; six to seven outer gradate veins; both rows ~regularly stepped, slightly convergent on each other distally. Second cell beneath Rs with i.g. at base = 1.7–2.1 mm tall, 2.2–2.7× width; third cell = 1.7–2.1 mm tall, 2.6–3.0× width. Second gradate cell 0.9–1.8 mm tall, 1.7–2.3× width; third gradate cell 0.8–1.1 mm tall, 1.5–2.0× width. Length of second cell beneath Rs with i.g. at base = 1.6–1.9× length of second gradate cell. Three intracubital cells, distal one open, icu1, icu2 each shorter than icu 3; icu1 shorter than icu2. Vein 1A forked. Hindwing narrow, with apex slightly acute;12.5–15.2 mm long, 3.8–4.7 mm wide. Ten to eleven radial crossveins; four to five inner gradates; six to seven outer; three b cells, plus small t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline (color faded on all specimens); stigma slightly opaque, with brownish tinge; costa pale; other longitudinal veins pale, heavily darkened at intersections; costal veinlets, most crossveins pale, darkened at tips; most distal crossveins, darkened mesally, at tips; gradates, base of im1, ma, cubital crossveins dark brown. Hindwing similar to forewing, except terminal veinlets mostly pale, darkened at base only, except terminal veinlets below PsCu also dark mesally.

Abdomen (Figs 43, 45): Tergites 1–4, distal part of 6–8 brown; tergites 5, basal 6 cream to brown; sternites 1–2 mostly brown, 3–6 mostly cream, sometimes with brown marks; pleural regions probably cream. Tergite 9+ectoproct cream, lower margin with brown mark along ventral apodeme; S7 (female, male), S8&9 (male) cream. Callus cerci cream-colored, trichobothria light amber, short, thin. Tergite 6: roughly quadrate, with rounded ventral margins, without noticeable ventral extension; length ~2.1–3.0 times greater than height (lateral view); with medium length, slender setae. Tergite 7 similar to T6, but only 1.6–2.0 times longer than tall. Pleural region P6, P7 with very few setae. Sternite 6: quadrate, dorsal margin straight, length

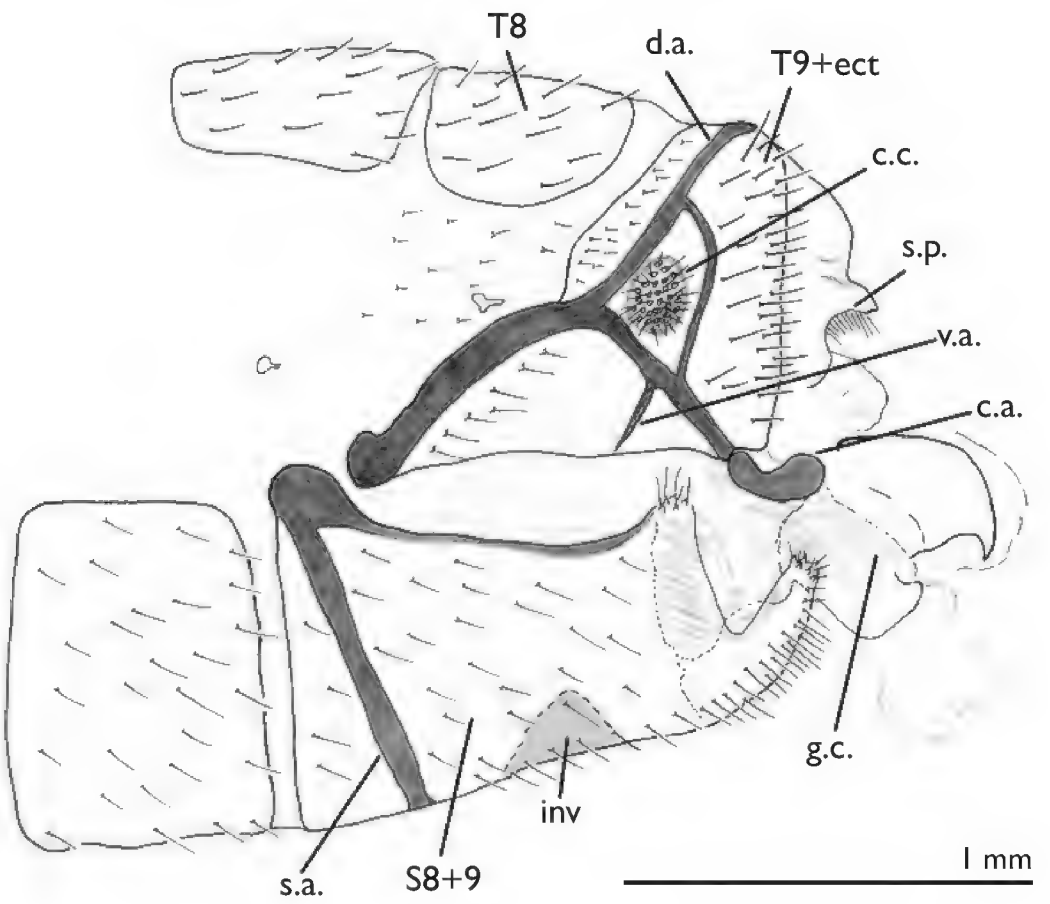

Figure 43. *Chrysopodes* (*Neosuarius*) *escomeli*: Male terminus, lateral. **c.a.** caudal arm of apodeme on T9+ectoproct **c.c.** callus cerci **d.a.** dorsal arm of apodeme on T9+ectoproct **g.c.** gonarcal complex **inv** sclerotized invagination along midline of S8+9 **s.a.** submarginal apodeme of S8+9 **s.p.** setose subrectal plate **S8+9** fused eighth and ninth sternites **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct **v.a.** ventral arm of apodeme on T9+ectoproct.

~0.9–1.1× height, with medium length, straight, slender setae. Spiracles oval, not enlarged; atria not enlarged.

Male (Figs 43, 44): T8 rounded anteriorly, posteriorly (lateral view), with no apparent ventral extension. Left, right T9+ectoproct fused dorsally; terminal edge straight vertically, bearing vertical field of dense, long, robust setae distally; apodeme heavy, Y-shaped, with base of Y extending anteriorly beyond T8 (Y leaning posteriorly, arms separating immediately behind, below callus cerci); dorsal arms of left and right apodemes approaching, but not coalescing dorsally; caudal arm rounded, enlarged distally, extending beyond tip of T9+ectoproct, with two thin, vertical projections at midregion, dorsal projection extending around callus cerci, ventral arm thin, extending to ventral margin of ectoproct. Callus cerci oblong (0.18–0.19 mm tall, 0.13 mm wide), with 29–35 trichobothria. S8+9 length ~1.5× proximal height, with ventral margin slightly concave mesally, with rounded invagination on midline; posterior region with heavy, transverse, submarginal apodeme; dorsal margin slightly concave, with lightly sclerotized dorsal apodeme, bearing rounded, upward-projecting protuberances proximally, distally; dorsal margin of distal apodeme with field of setae with enlarged setal bases; terminus corniform, upturned, rounded, with distal margin bearing setae with enlarged setal bases, large internal membranous fold or pouch, lined with dense field of fine gonocristae. Sub-

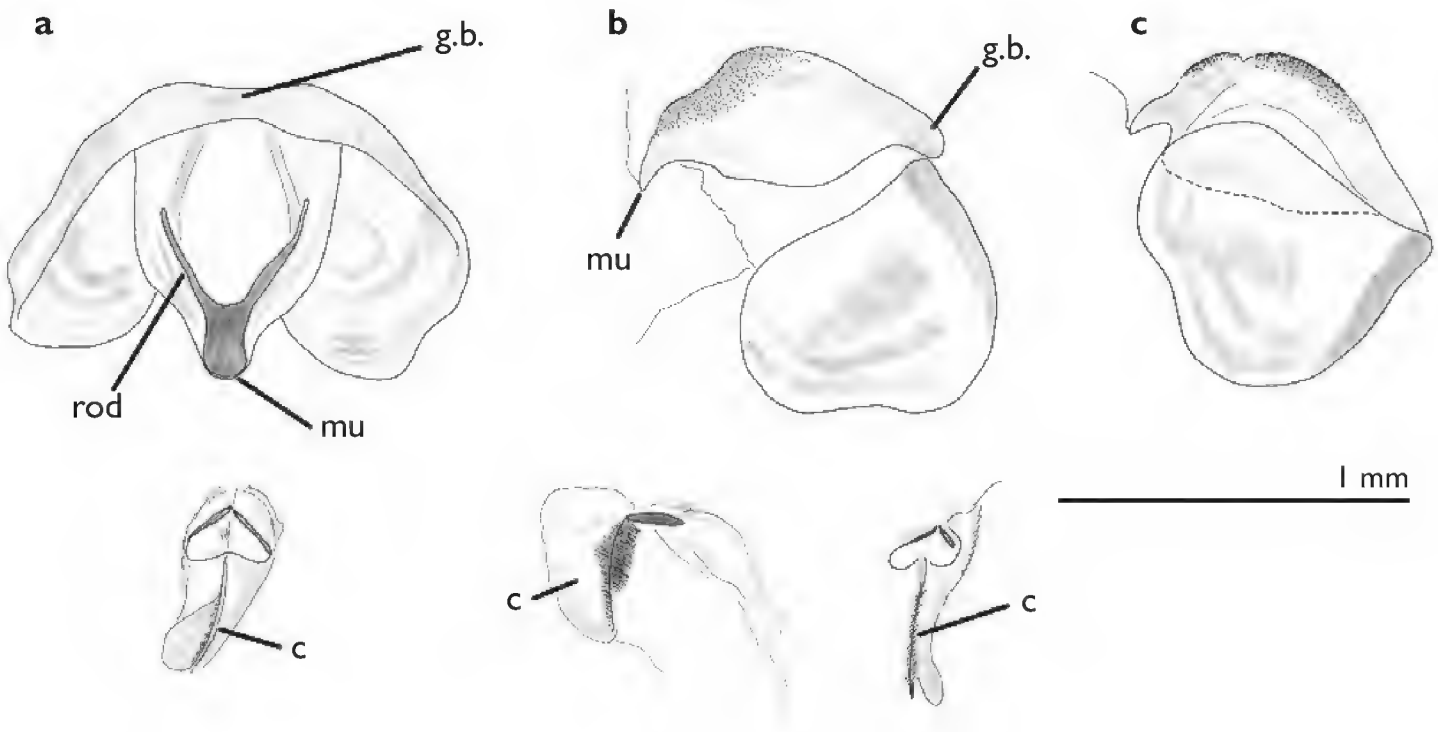

Figure 44. *Chrysopodes* (*Neosuarius*) *escomeli*: Male genitalia **(a)** gonarcus (dorsal) with hypandrium internum below (dorsal) **(b)** expanded gonarcus (lateral), with hypandrium internum below, lateral (left), frontolateral (right) **(c)** unexpanded gonarcus (lateral) **c** combes **g.b.** gonarcal bridge **mu** mediuncus **rod** internal rod of mediuncus.

anal plate well sclerotized, with dense, robust setae Gonarcus robust, broadly arcuate, loosely attached to T9+ectoproct dorsally via long, folded subanal membrane; span of gonarcus at bridge ~0.42 mm, span between gonarcal apodemes distally ~0.45 mm. Gonarcal apodemes smooth, scalloped, enlarged, rounded distally (dorsal view), roughly quadrate (lateral view, with gonarcus), flared distally. Mediuncus broadly articulated with gonarcal bridge; dorsum rounded, bent perpendicularly, with ventral beak; internally with pair of curved dorsal rods that extend into the beak, without field of setae; dorsal surface with dense covering of microsetae; surface below beak without gonosetae or gonocristae. Gonosaccus large, delicate membrane, without gonosetae. Hypandrium internum very lightly sclerotized (found in only 1 of 3 well-sclerotized and stained specimens), with small arrow shaped head, tall, thin, sail-like comes.

Female (Figs 45–48a): Tergite 8: length ~1.3–1.6× height (fully sclerotized section); ventral extension with medium length, slender setae. Tergite 9+ectoproct (lateral view) with proximal margin straight throughout or with slight bulge mesally, not extending anteriorly much beneath T8; ventral margin extending posteriorly well below ventral margin of gonapophyses laterales. Callus cerci slightly taller than broad (0.15–0.18 mm tall, 0.13–0.15 mm wide), with approximately 31–33 trichobothria. Gonapophyses laterales < 1/2 height of T9+ectoproct, approximately 2.7–2.8 times taller than wide, with robust setae, blunt dorsally, ventrally, orientated posteroventrally (~20° angle from midline). Sternite 7: with medium-length, slender setae; lateral view: length ~1.8–1.9× height of proximal margin,

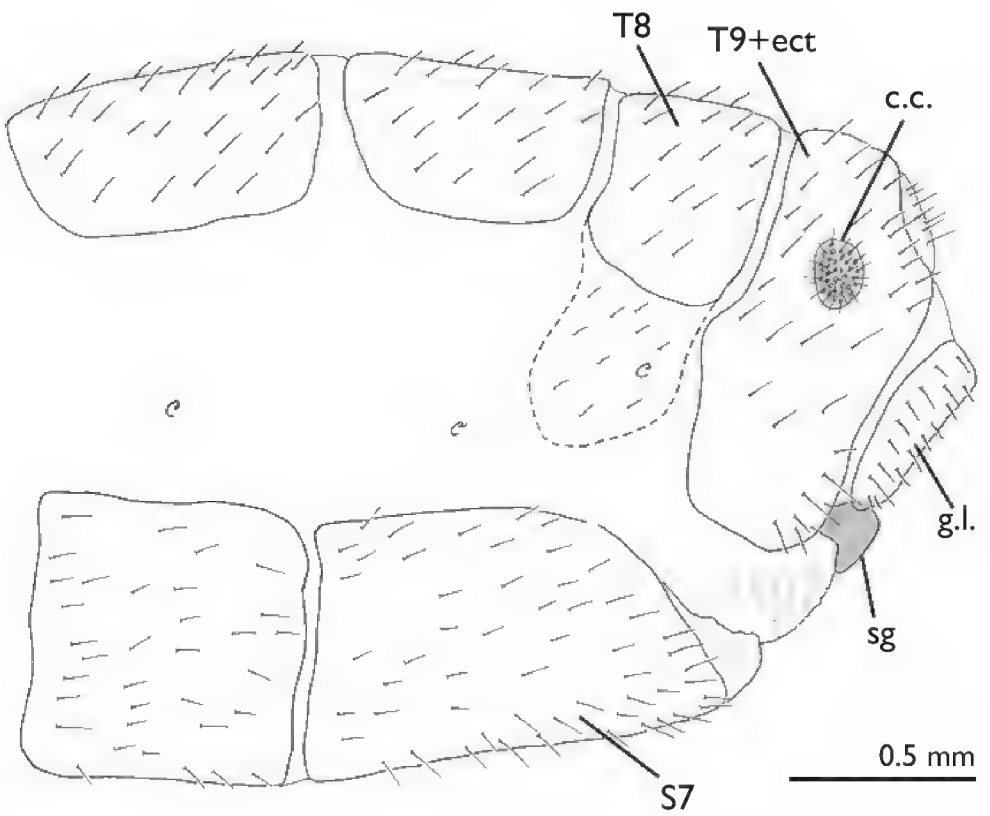

Figure 45. *Chrysopodes* (*Neosuarius*) *escomeli*: Female terminus, exterior, lateral. **c.c.** callus cerci **g.l.** gonapophysis lateralis **sg** subgenitale **S7** seventh sternite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct. Setose subrectal plate not shown.

distal 3/4th gradually sloping to rounded terminus. Subgenitale broad, with base rounded, clear, transversely folded, attached to S7 via short, textured, shallowly invaginated membrane; distal process knob-like, rounded, bilobed distally, extending perpendicularly from neck; without digitiform process. Pair of large, bulbous bursal glands, each with elongate, narrow duct opening on anterolateral margin of bursa, with long, narrow accessory duct distally. Bursa large, extending laterally full width of segment, posteriorly well beyond spermatheca. Bursal duct transversely fluted anteriorly (near bursa), with most folds sharp-edged, small longitudinal folds distally (towards anterior of body). Spermatheca elongate, tubular, with two sharp mesal bends on the right, tight loop on the left, open to bursa via elongate dorsal slit throughout; spermatheca ~1.4 mm long, 0.13 mm in diameter; invagination elongate, narrow (not measured); velum not identified. Spermathecal duct arising from tip of spermatheca on dorsal, left side, extending into subgenitale, with one U-shaped curve, with short (0.5 mm long) sclerotized region, followed by short (0.25 mm) unsclerotized, brushy region (visible only with compound microscope). Colleterial gland smooth-textured, extending beyond middle of seventh segment; reservoir small, bulbous, smooth-textured; no accessory glands found. Transverse sclerotization well-formed, flat, ellipsoid plate, with elongate hair-like teeth, extending from deep, spiny membranous invagination, located mesally on gonapophyses laterales.

Larvae. Unknown.

Eggs. Weakly stalked, laid in clusters (Navás 1932a: 57).

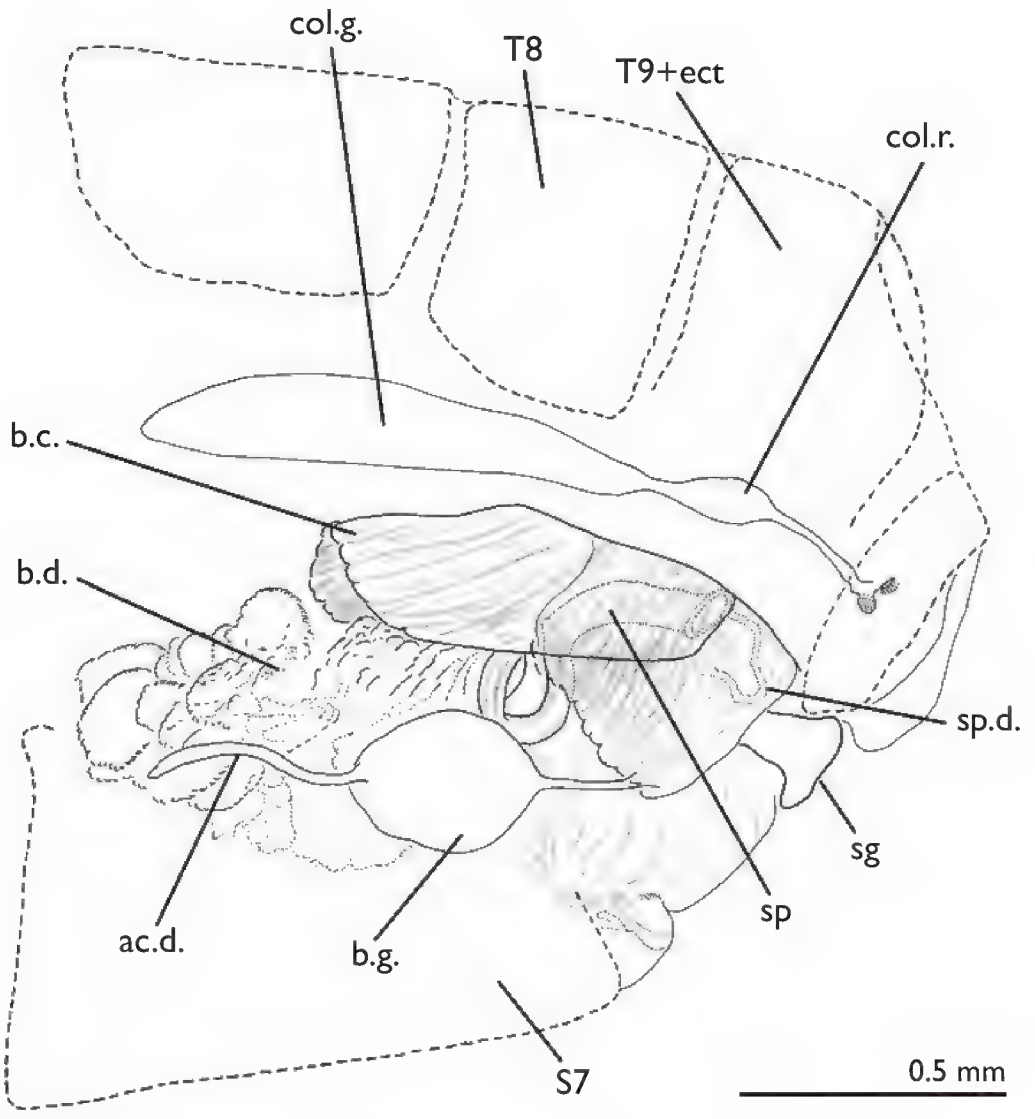

Figure 46. *Chrysopodes* (*Neosuarius*) *escomeli*: Female terminus, interior, lateral. **ac.d.** accessory duct of bursal gland **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **col.g.** colleterial gland **col.r.** colleterial reservoir **sg,** subgenitale **sp** spermatheca **sp.d.** spermathecal duct **S7** seventh sternite **T8** eighth tergite **T9+ect** ninth tergite and ectoproct.

Biology. Adults were collected in all months except April, June and December, and pollen grains were in the guts of several specimens. There is one report of adults roosting and ovipositing in grotto entrances (L. Stange and B. Miller, cited in Adams and Penny 1985, 1986).

Type material. ***Chrysopa escomeli* Navás.** The Lectotype (sex unknown, examined) is in the MNHN (Legrand et al. 2008 [2009]: 135). Its label data read: – (1) "Museum Paris, Pérou, env. d'Aréquipa, Dr. Escomel 1912" [green]; (2) "Chrysopa Escomeli Nav., P. Navás S. J. det." [prob. Navás' hand; green]; (3) "TYPE"; (4) "LECTOTYPE, *Chrysopa escomeli* Navás, 1922; dés. J. Legrand & C. Tauber '08" [red]. Navás (1921a: 259) indicated that the type specimen was lacking its abdomen.

Specimens examined (adults, in addition to type listed above). **CHILE. Tarapacá:** Arica, Lluta, II-7-1965, L. Peña (1F, FSCA, det. P. Adams; 2F, 3M, CAS, det. P. Adams); Azapa, II/5/1965, L. Peña (2F, 2M, CAS, det. P. Adams); Canchones, Salar de Pintados, 20°27'S, 69°37'W, IX/8/1966, UV light, G. Loayza, L. Campos (3M, CAS, det. P. Adams); Camarones, XI/30/1952, L. E. Peña (1N, CAS, det. P. Adams); Mouth

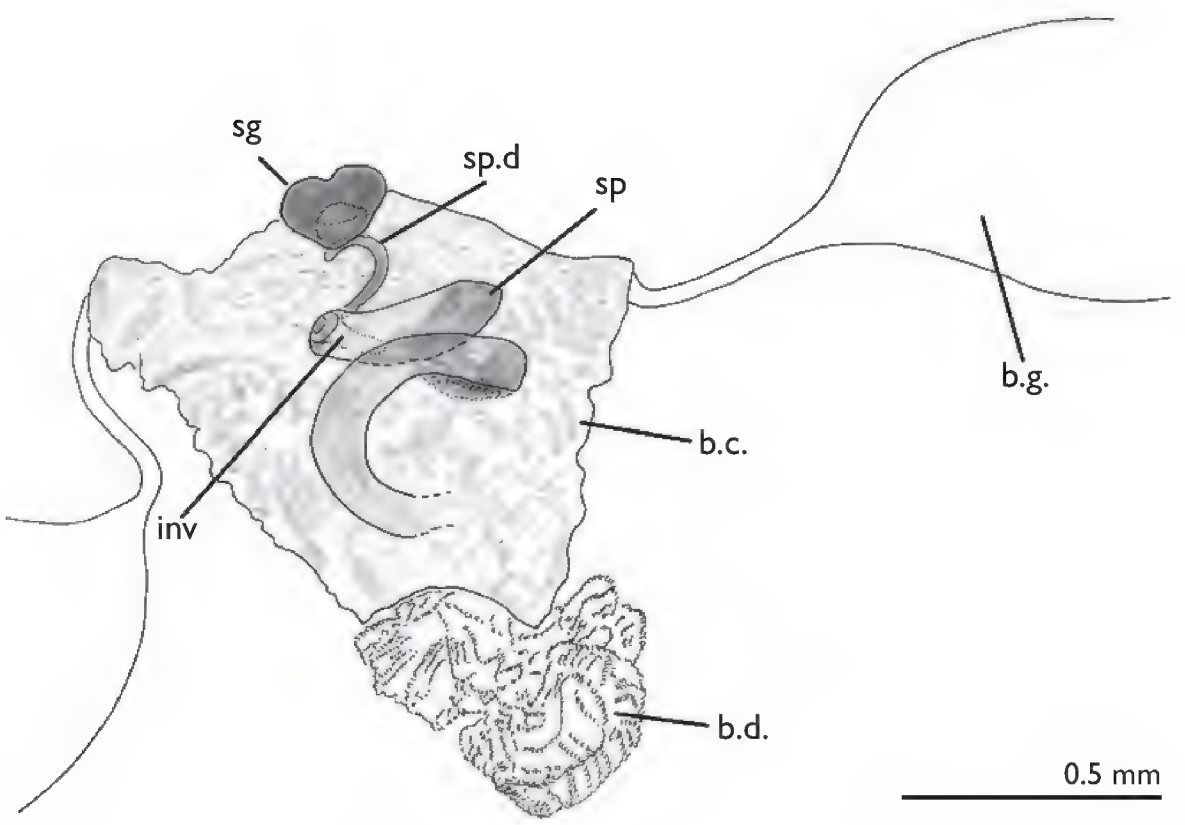

Figure 47. *Chrysopodes* (*Neosuarius*) *escomeli*: Female genitalia, ventral. **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** base of bursal gland **inv** invagination in spermatheca **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

of Lluta Riv., 18°25' S, 70°06'W, X/1/1966, M. E. Irwin (1F, CAS, det. P. Adams). **PERU. Cajamarca,** Jaén. RioHuancabamba, Acapulco at KM 81 Olmos-Marañón, rd. 1100m, X/1/1964, P. C. Hutchison & J. K. Wright [1F, CAS]. **Lambayeque:** 28 km. E. Olmos. Marañón Hwy. Resst. El Salvador. Alt. 1150 m, I/4/1964, P. C. Hutchison & J. K. Wright (1M, CAS). **Lima:** Matucana, III/8/1928, R. C. Shannon (4F, USNM); Ohurin, 2200 m, VIII/17/1952, W. Weyrauch (9M, 9F, 2?, FSCA); Santa Euralia near Casta, II/26/1981, M. E. Irwin (1M, INHS); Santa Rosa de Quives, nr. Yangas, 1100 m, V/28/1996, J. G. Rozen & A. Ugare (6F, AMNH); Surco, Valle del Rio Rimac, 1800m., X/9/1963 (8 sex?, damaged, AMNH); Verrugas, V/19/1928, R. C. Shannon (2F, USNM); San Geronimo, VII/29/1982, B. Miller, L. Stange, C. Porter (1F, CAS, det. P, Adams); 15 km. NE. Chosica, 500 m., IX/14/1954, E. I. Schlinger & E. S. Ross (1F, CAS); Lima, Cañete, cotton, E. Nuñez (1F, CAS). **La Libertad:** Samne ca. Trujillo, 1,500 m, VII/12–19/1975, C. Porter & L. Stange, 4M, FSCA; Samne, ca. 40 km NE Trujillo, 7°59'S, 78°41'W, elev. ca 1500m, VII/12–17/1975, C. Porter, L. Stange (1M, FSCA); Samne, 40 km W Trujillo, 1500m, VII/12–17/1975, C. Porter, L. Stange (2F, CAS, det. P. Adams); 9 km W. Samne, VII/28/1982, R. B. Miller, L. A. Stange (1M, 1F, FSCA). **ECUADOR. Loja:** San Pedro, w/Loja, VIII/14/1965, L. E. Pena (7F, 2M, CAS). Rio Leon, 1700 m, 30°33S 79°16W, III/22/1965, L. E. Peña (13F, 5M, 1?, CAS).

Known distribution. Northern Chile, Peru, Ecuador.

Variation. There is little variation in the depth or extent of the head and facial markings. The variation in size is indicated in the descriptions above.

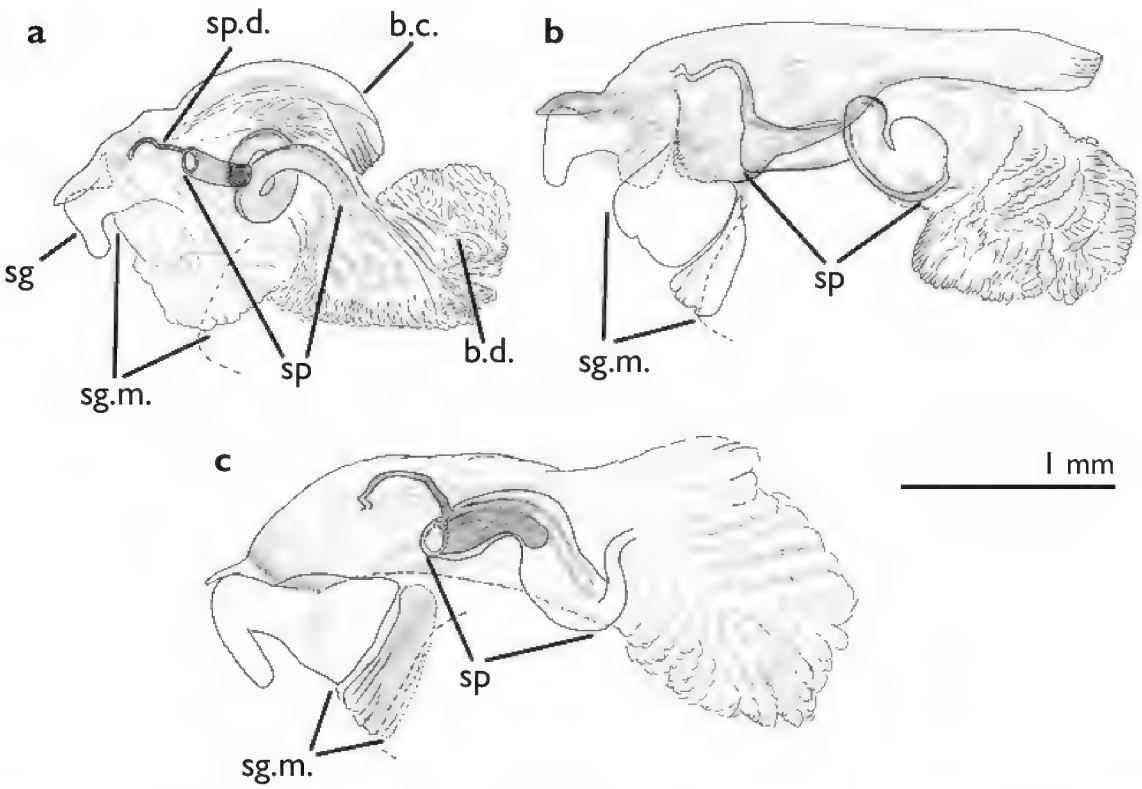

Figure 48. Female genitalia, lateral (bursal glands not shown): **(a)** *Chrysopodes* (*Neosuarius*) *escomeli* **(b)** *Chrysopodes* (*Neosuarius*) *flavescens* **(c)** *Chrysopodes* (*Neosuarius*) *porterinus*. In all species, the spermatheca is nestled below the bursal copulatrix. **b.c.** bursa copulatrix **b.d.** bursal duct **sg.** subgenitale **sg.m.** membranous base of subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

***Chrysopodes (Neosuarius) flavescens* (Blanchard, 1851)**
Figs 40b, 41b, 48b, 49–55

Hemerobius flavescens Blanchard 1851, in Gay 1851: 123, Fig. 9 [MNHN, Lectotype (by present designation): Chile].

Chrysopa flavescens (Blanchard, 1851). Navás 1910c: 238 [transfer to *Chrysopa;* note stating that six types from Chile are in the MNHN]; Penny 1977: 18 [species list].

Chrysopa nosina Navás, 1913: 85 [MZB, Lectotype (by present designation): "Nos (Chile), Marzo 1910 (Col. M. Porter debit)"]. Navás 1918: 222 [redescription]; Navás 1921a: 259 [distribution]; Navás 1922b: 361; [distribution]; Navás 1923: 116 [distribution]; Navás 1925c: 307 [distribution]; Navás 1926: 326 [distribution]; Navás 1927: 324 [distribution]; Navás 1929b: 19 [distribution]; Navás 1932b: 80 [distribution]; Navás 1934: 14 [distribution]; Monserrat 1985: 238 [list of Navás types in MZB]; Brooks and Barnard 1990: 272 [transfer to *Chrysopodes* (*Neosuarius*)]; Oswald 2007 [catalog listing as *Chrysopodes* (*Neosuarius*) *nosinus*, nomenclature]; Legrand et al. 2008: 157 [Navás specimens]. **New Synonym.**

Chrysopa jaffuelina Navás, 1918: 222 [MZB, Lectotype (by present designation): "Chile: Los Perales, Marga-Marga, Enero de 1918, P. Jaffuel (Col. M.)"]. Navás 1921b: 443 [species list]; Navás 1921a: 259 [distribution]; Navás 1934: 14 [distribution]; Penny 1977: 19 [species list]; Monserrat 1985: 238 [list of Navás types in MZB]; Brooks and Barnard 1990: 272 [transfer to *Chrysopodes* (*Neosuarius*)]; Os-

Figure 49. *Chrysopodes* (*Neosuarius*) *flavescens*: Variation in head and thoracic coloration: **(a)** Argentina: Neuquén **(b)** Chile: Valparaíso **(c, d)** Chile: Santiago.

wald 2007 [catalog listing as *Chrysopodes* (*Neosuarius*) *jaffuelinus*, nomenclature]. **New Synonym.**

Chrysopa bullocki Navás, 1933a: 230 [MZB, Lectotype (by present designation): "Chile: Angol, 10-I-1932"]. Penny 1977: 17 [species list]; Monserrat 1985: 237 [list of Navás types in MZB]; Brooks and Barnard 1990: 279 [listed as *'Chrysopa' incertae sedis*]; Oswald 2007 [catalog listing]. **New Synonym.**

Chrysopodes (*Neosuarius*) *flavescens* (Blanchard, 1851). Adams and Penny 1985 [1987]: 436 [transfer to *Chrysopodes*]; Brooks and Barnard 1990: 272 [species list]; Oswald 2007 [catalog listing, nomenclature].

Diagnosis. *Chrysopodes* (*N.*) *flavescens* is one of several Andean species [including *C.* (*N.*) *porterinus* and *C.* (*N.*) *escomeli*] that have robust, more or less darkly marked bodies (with variable coloration). Definitive differentiation of the three species requires examination of the genitalia. However, most specimens of *C.* (*N.*) *flavescens* can be distinguished by their slightly broad wings (Fig. 50), the longitudinal veins of which are green with only very small dark spots at the junctions with crossveins. The head and body markings, as well as the dark antennae resemble those of *C.* (*N.*) *porterinus,* but the *C.* (*N.*) *flavescens* body tends to be lighter colored; for example, the brown longitudinal stripe down the center of the pronotum (if present) is generally narrower and lighter than that in *C.* (*N.*) *porterinus*. *C.* (*N.*) *flavescens* generally have a single brown stripe (sometimes incomplete) on the dorsolateral margin of the scapes (Figs 40b, 41b).

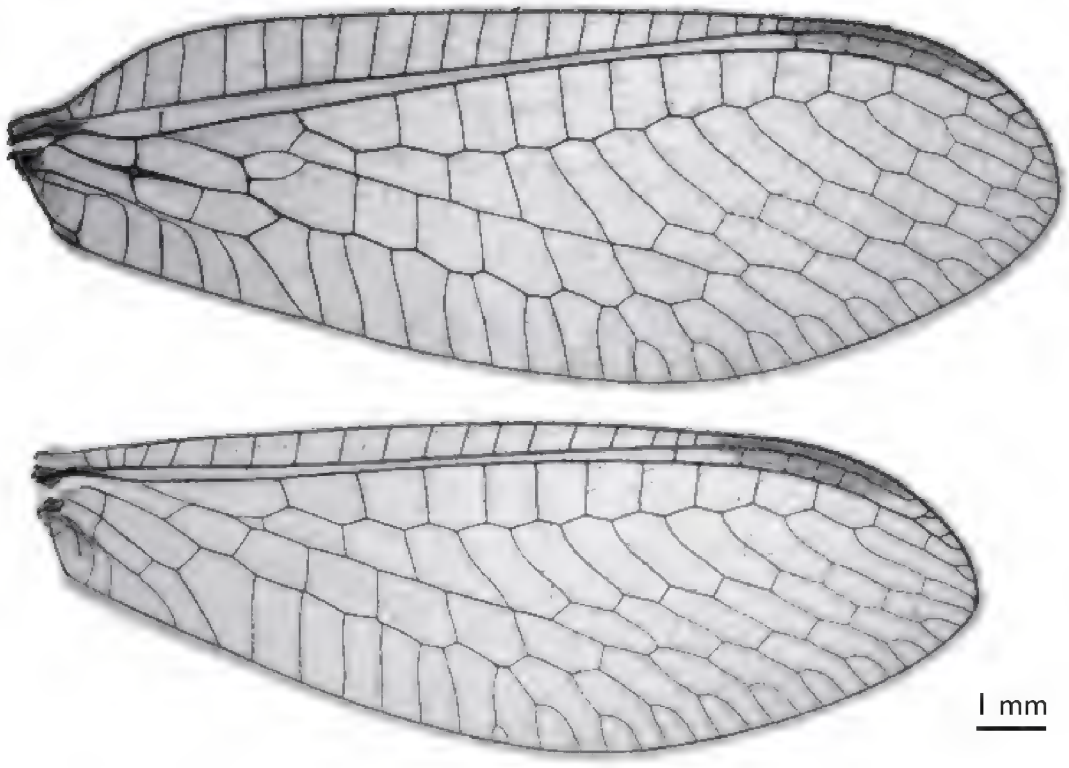

Figure 50. *Chrysopodes* (*Neosuarius*) *flavescens*: Forewing, hindwing (Chile, Santiago).

The stripe is usually absent from the *C.* (*N.*) *porterinus* scape, and the *C.* (*N.*) *escomeli* scape has two pairs of stripes.

The male *C.* (*N.*) *flavescens* is recognized by its broad gonarcus, the position and shape of the apodemes on T9+ectoproct, and the invaginated apodeme along the midline of S8+9 (Figs 51, 52). In mature female *C.* (*N.*) *flavescens,* the spermatheca has one sharp turn and a bean-shaped enlargement at the bursal end; the subgenitale has a distinct, rounded terminal process extending from a substantial neck; the length (ventral surface) of the neck is about equal to the height of the distal surface of the process (Figs 48b, 54, 55). The subgenitale also has a relatively large, clear, smooth (or only lightly folded) area above S7; this area is absent from *C.* (*N.*) *porterinus* females, and it is transversely folded, not smooth, on *C.* (*N.*) *escomeli* females (Fig. 48).

Description. *Head* (Figs 40b, 41b, 49): Width (frontal, including eyes) 1.5 - 1.6 mm; ratio, head : eye width = 2.7–2.9:1; distance (straight-line) between tentorial pits 0.44–0.51 mm. Distance between antennae ~0.10–0.14 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.41–0.48 mm; clypeus ~0.20–0.28 mm long. Antenna ~0.6× length of forewing (9.3–9.5 mm). Vertex slightly raised, flat throughout, with upward fold posteriorly; surface of vertex smooth, without setae. Frons relatively flat, smooth, shiny throughout. Clypeus mostly flat, very slightly raised in middle; surface smooth. Labrum flat, surface smooth; distal margin straight or with very small cleft.

Head coloration: Head cream with markings reddish brown to brown; vertex with reddish brown around entire edge of dorsal torulus, reddish brown slash within torulus, diffuse reddish brown mark outside margin of raised area; posterolateral region usually unmarked. Genae marked with brown to light brown distally; frons cream, with pair of brown marks on mesal margin of torulus; clypeus cream to amber, lateral edges emarginated with brown. Scapes cream with brown, dorsolateral stripe; pedicel

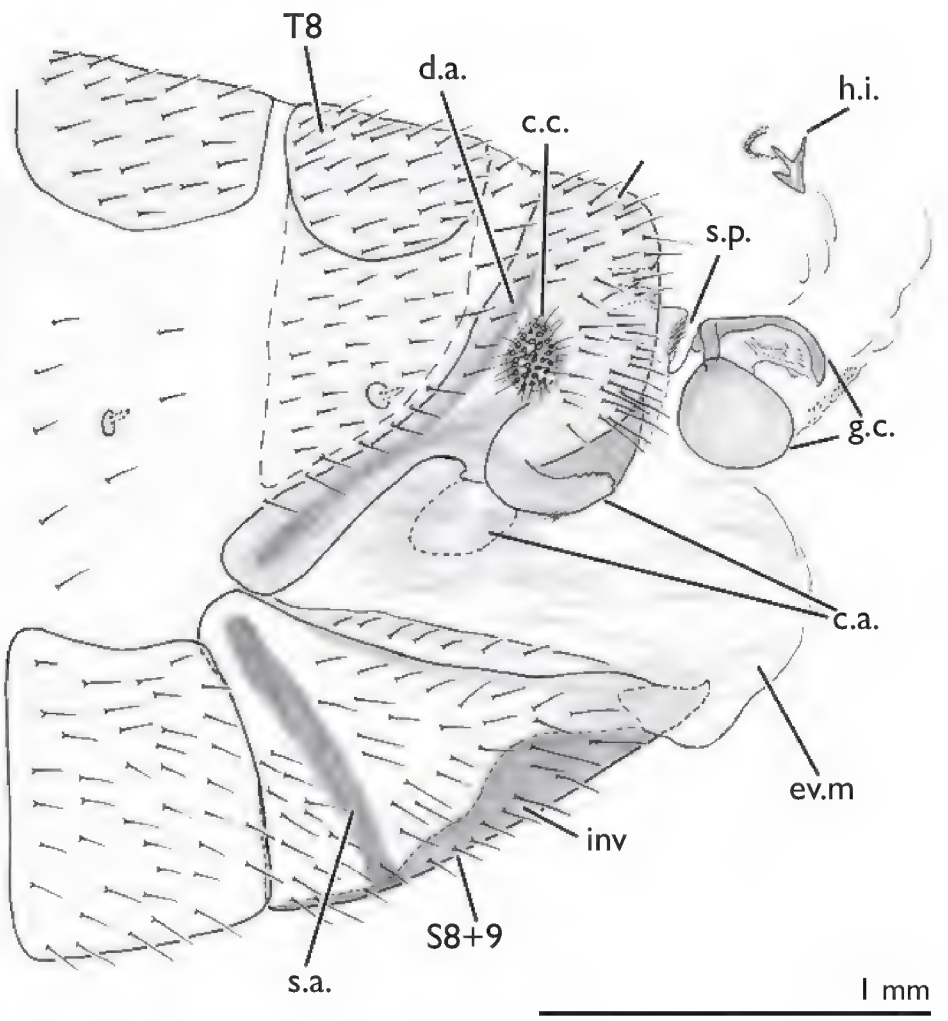

Figure 51. *Chrysopodes* (*Neosuarius*) *flavescens*: Male terminus, lateral (gonarcal complex and membrane at tip of S8+9 inflated). **c.a.** caudal arm of apodeme on T9+ectoproct **c.c.** callus cerci **d.a.** dorsal arm of apodeme on T9+ectoproct **g.c.** gonarcal complex **h.i.** hypandrium internum **inv** sclerotized invagination along midline of S8+9 **ev.m.** eversible membrane **s.a.** submarginal apodeme of S8+9 **s.p.** setose subrectal plate **S8+9** fused eighth and ninth sternites **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct **v.a.** ventral arm of apodeme on T9+ectoproct.

cream, with brown mesal band; flagellum dark brown throughout. Maxillary palp with distal segment dark brown; penultimate, middle segments dark brown laterally, pale mesally; basal two segments pale. Labial palp with terminal segment brown, basal two pale. Venter cream, unmarked except base of mentum with small brown marks laterally.

Thorax (Fig. 40b): Pronotum wider than long: ~0.51–0.76 mm long; ~1.17–1.33 mm wide; cream to light tan, with thin, crooked or broken, reddish brown stripe on midline; pair of reddish brown crooked sublateral stripes (0.09–0.22 mm wide), lateral margin brown throughout or cream-colored with small, brown marks anteriorly; numerous long, stout, brown setae (longest ~0.21–0.25 mm long). Meso-, metanota cream-colored, usually with pair of reddish brown longitudinal bands laterally, sometimes entirely cream colored; setae sparse, generally brown on mesothorax, pale on metathorax. Pleural areas cream-colored, without markings. Legs cream-colored without markings, except coxae with brown mark posteriorly, small on procoxae, large on meso-, metacoxae; tarsi amber-tinged. Tarsal claws amber, recurved with broad cleft, quadrate base.

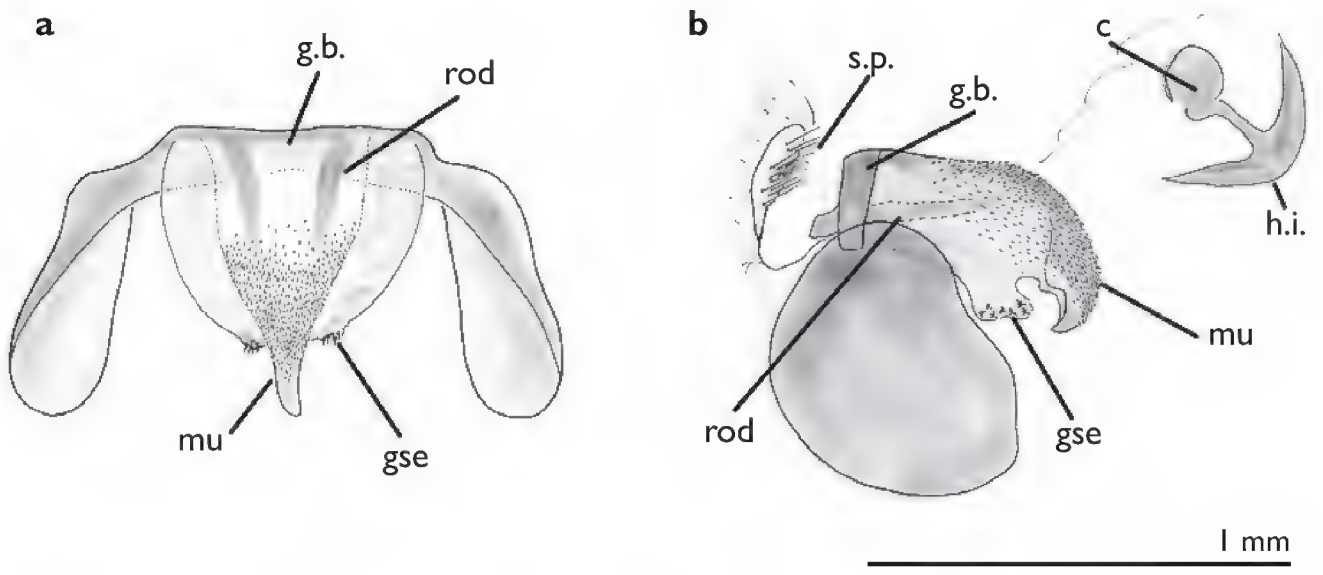

Figure 52. *Chrysopodes* (*Neosuarius*) *flavescens*: Male genitalia **(a)** gonarcus (dorsal) **(b)** gonarcus (lateral), with hypandrium internum (dorsal) on right, above **c** combes **g.b.** gonarcal bridge **gse** gonosetae **h.i.** hypandrium internum **mu** mediuncus **rod** internal rod of mediuncus **s.p.** setose subrectal plate.

Wings (Fig. 50): Forewing 13.9–16.1 mm long, 4.9–5.7 mm wide; L:W ratio, 2.8–2.9; width greatest near midpoint, tapering at basal 1/4th and distal 3/4th of wing; costal margin fairly straight, sloping gradually at base; apex fairly broad, rounded. Distal section of M (before furcation of M1 and M2), ma, m-cu1, base of Cu1 (above icu1) crassate. Costal area slightly enlarged; height of tallest costal cell (#5, 6) = 4.1–4.9× length of first costal vein, 0.18–0.19× width of wing. Subcosta, radius sinuate; most subcostal veinlets, radial crossveins straight. Eleven to twelve closed radial cells (between R and Rs), height of tallest radial cell 1.4–1.5× width; other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four to five b' cells. First intramedian cell ovate, 0.6× width of third medial cell; inner row of five to seven gradate veins; seven to eight outer gradate veins; both rows regularly stepped, very slightly convergent to each other distally. Second cell beneath Rs with i.g. at base = 1.8–2.2 mm tall, 2.7–3.4× width; third cell = 1.4–2.1 mm tall, 3.0–3.3× width. Second gradate cell 1.4–1.5 mm tall, 2.2–2.6× width; third gradate cell 1.4–1.6 mm tall, 2.6–3.0× width. Length of second cell beneath Rs with i.g. at base = 1.3–1.5× length of second gradate cell. Three intracubital cells; distal one open, icu1, icu2 each shorter than icu3; icu1, icu2 similar in length. Vein 1A forked. Hindwing narrow, with tip ovate; 12.7–14.4 mm long, 4.3–5.1 mm wide. Eleven to twelve radial crossveins; four to six inner gradates; seven to eight outer gradate veins; three b cells, plus small t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline; stigma tinged with tan. Longitudinal veins largely green, with brown at intersections, forks; costal veinlets, crossveins mostly green or green with brown at intersections; gradates usually brown.

Abdomen: Dorsum, pleuron mostly cream-colored, with scattered brown spots; venter usually brown basally (S1-S4), cream-colored distally (S5-S7), variable from all cream-colored to all brown; terminal segment of male (S8+9) cream-colored, with margins, midline usually outlined in brown. Callus cerci pale; trichobothria pale. Tergites

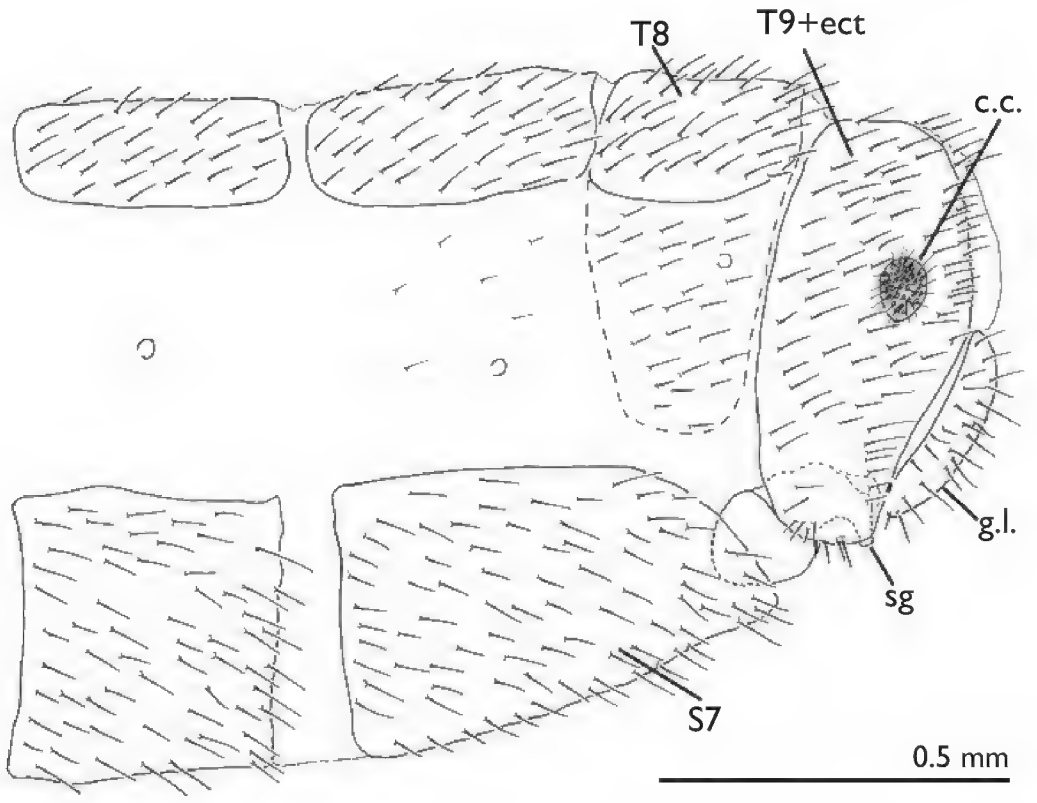

Figure 53. *Chrysopodes* (*Neosuarius*) *flavescens*: Female terminus, exterior, lateral. **c.c.** callus cerci **g.l.** gonapophysis lateralis **sg** subgenitale **S7** seventh sternite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct. Setose subrectal plate not shown.

6, 7: roughly quadrate, with rounded margins; length ~1.6–2.1 times greater than height (lateral view). Sternite 6: quadrate, dorsal margin straight; length ~0.9–1.2× height. Spiracles oval, not enlarged; atria not enlarged.

Male (Figs 51, 52): T8 rounded anteriorly, posteriorly (lateral view), with setose ventrolateral extension reaching below spiracle. Tergite 9+ectoproct rounded, fused dorsally, indented distally; posteroventral region with tuft of long, robust setae; ventral margin with apodeme heavy, straight basally, dividing mesally, with dorsal arm curving behind callus cerci almost to top of T9 (in well sclerotized individuals), with ventral section curving around distal margin of callus cerci, also curving distoventrally as bifurcated, invaginated, ventral and caudal arms. Ectoproct of well-sclerotized individuals with ventral margin bending mesally, invaginating adjacent to invaginated apodemes. Callus cerci taller than wide (~0.20 mm tall, ~0.14 mm wide), with ~31 trichobothria. S8+9: ratio, length : height (basal), 1.5 : 1; with heavily sclerotized, sub-basal, transverse apodeme, longitudinal, invaginated, sinuous apodeme on midline; ventral margin straight throughout; basal margin straight, rounded dorsally; dorsal margin sclerotized, slightly convex, tapering to acute tip; terminus with robust membrane extending from distal margin, laterally bearing small, dense field of acute gonocristae laterally (only in heavily sclerotized individuals). Subanal plate small, lightly sclerotized, with sparse, short setae. Gonarcus robust, broad, almost transverse, tightly attached to T9+ectoproct via short subanal membrane; bridge well-sclerotized, but not heavy, with gonarcal apodemes extending broadly from distal margins of bridge; span of gonarcus near arch ~0.29–0.33 mm, span between gonarcal apodemes distally ~0.72–0.73 mm. Mediuncus broadly attached to distal edge of gonarcus, ex-

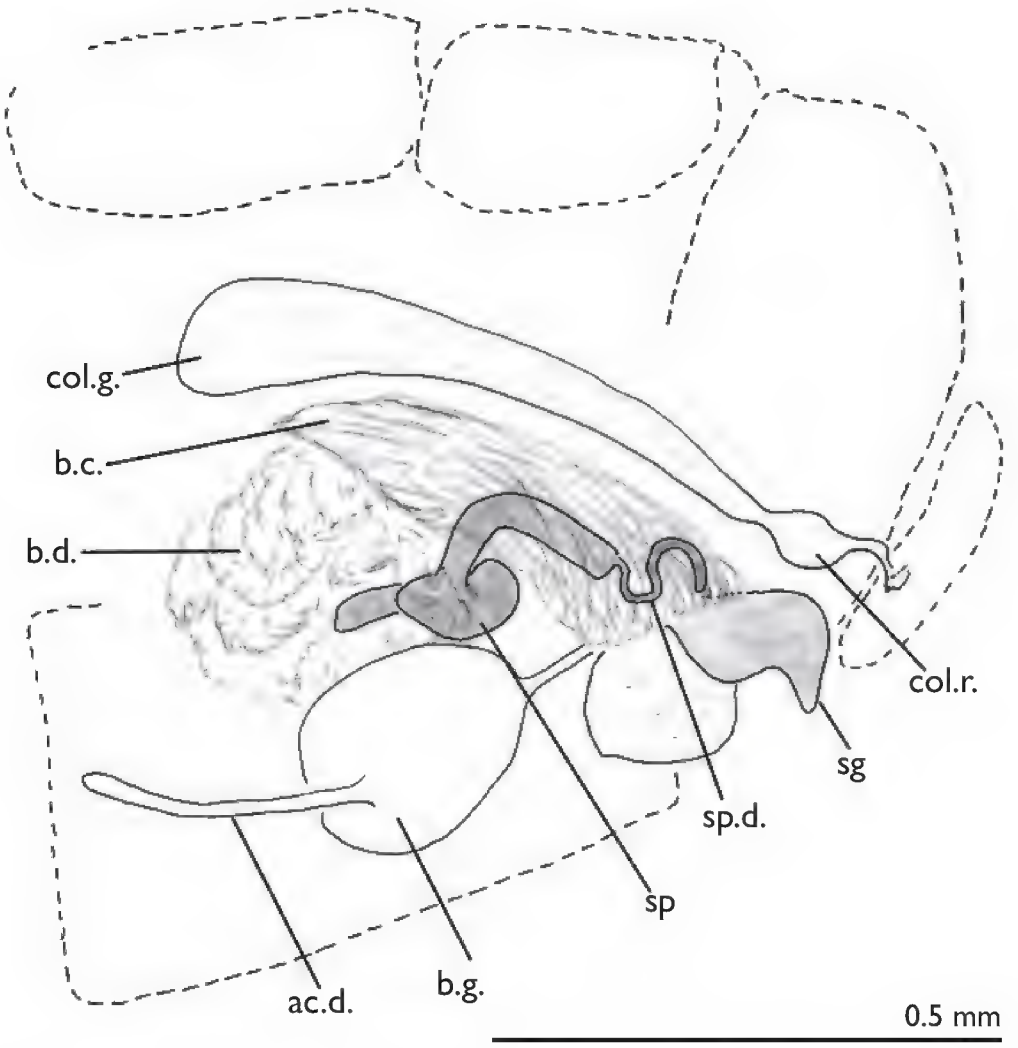

Figure 54. *Chrysopodes* (*Neosuarius*) *flavescens*: Female terminus, interior, lateral. **ac.d.** accessory duct of bursal gland **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **col.g.** colleterial gland **col.r.** colleterial reservoir **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

tending perpendicularly from frontal edge of gonarcus, with pair of internal, elongate rods extending from slightly below lateral margins of bridge distally about midway to tip of mediuncus. Tip of mediuncus bent downward, tapering to rounded, beak-like apex; membrane immediately below beak with four raised membranous protuberances bearing ~6 pairs of short gonosetae in deep sockets; gonosaccus membrane distal to gonarcus with fields of peg-like scales. Surface of mediuncus with dense, short, thin setae. Hypandrium internum roughly anchor-shaped, with relatively robust arms, C-shaped comes.

Female (Figs 48b, 53–55): Tergite 8: length 1.3–1.4 x height (lateral view); ventral extension with medium length, slender setae. Tergite 9+ectoproct (lateral view) mostly vertical, not extending much beneath T8; proximal margin fairly straight throughout or with slight bulge mesally; distal margin extending well beneath ventral margin of gonapophyses laterales. Callus cerci taller than broad (0.19–0.20 mm tall, 0.13–0.15 mm wide), with ~33 slender trichobothria. Gonapophyses laterales < 0.4× height of T9+ectoproct; ~3.1–3.9 times taller than wide; with fairly long, robust setae; rounded dorsally, ventrally; orientated posteroventrally (~30° angle from midline). Sternite 7: with robust setae; lateral view: length ~1.7–1.8× height of proximal margin, with distal 3/4th gradually sloping slightly to terminus; terminus approximately same height as

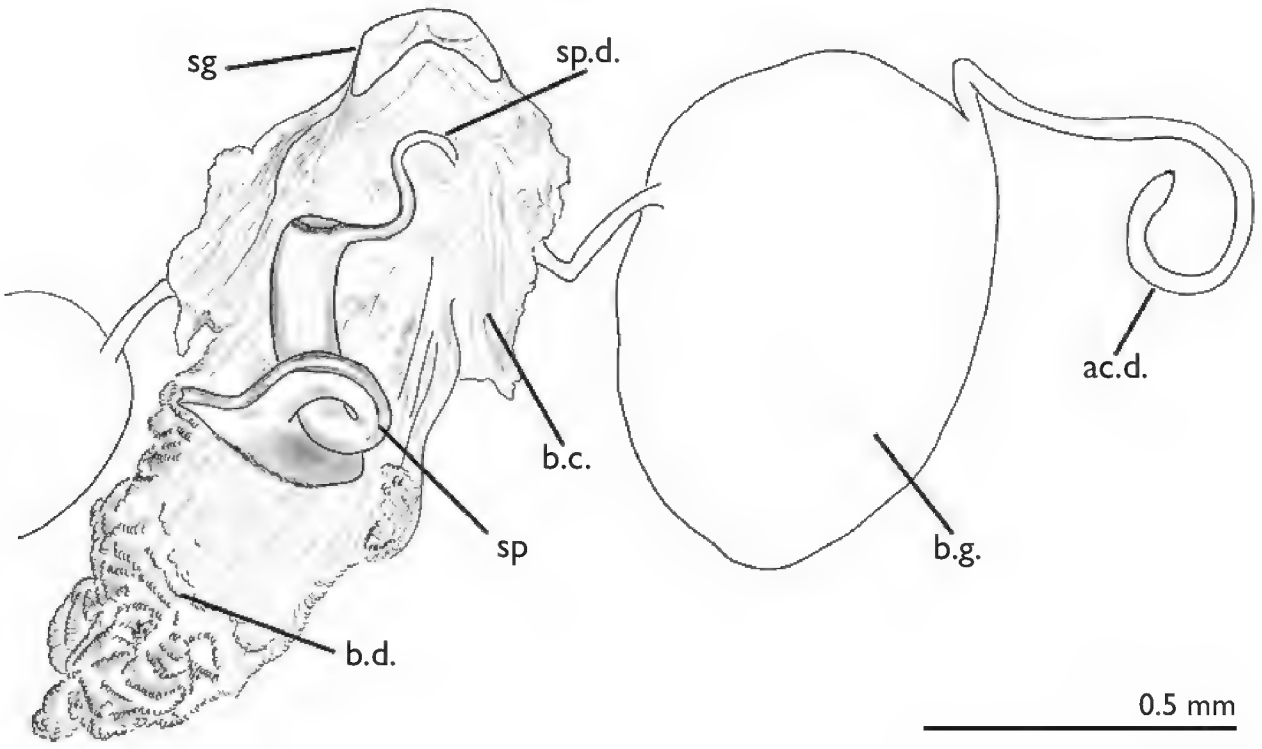

Figure 55. *Chrysopodes* (*Neosuarius*) *flavescens*: Female genitalia, ventral. **ac.d.** accessory duct of bursal gland **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

midsection. Subgenitale broad, with base rounded, clear, unfolded; attached to S7 via short, transversely folded, shallowly invaginated membrane; distal process knob-like, rounded, not noticeably bilobed distally, extending perpendicularly from neck; without digitiform process. Pair of large, bulbous bursal glands with elongate, narrow ducts opening on anterolateral margin of bursa, distally with long, narrow accessory ducts. Bursa long, narrow, extending well beyond spermatheca; dorsal surface with small longitudinal folds. Bursal duct enlarged, fluted, folded, flat, with most folds sharp-edged externally. Spermatheca elongate, tubular, with one sharp mesal bend, bean-shaped enlargement, open to bursa via elongate dorsal slit throughout; spermatheca ~0.8 mm long, 0.12 mm in diameter; invagination elongate, narrow (~0.4 mm long, ~0.05 mm wide); velum not identified. Spermathecal duct short (~0.44 mm long), with distal section (0.15 mm) brushy, arising from tip of spermatheca on dorsal, right side, extending into subgenitale, with one U-shaped curve. Colleterial gland smooth, extending beyond middle of seventh segment, with small, bulbous, smooth-textured reservoir; secondary glands not found. Transverse sclerotization well-formed, flat, ellipsoid, with elongate hair-like teeth, located mesally behind gonopophyses laterales.

Larvae. Unknown.

Eggs. Unknown

Biology. Unknown. Adults have been collected in all months from September through April, but not during late fall or winter months.

Type material. ***Hemerobius flavescens* Blanchard.** Four syntypes are in the MNHN; all are in poor condition. Here, the only specimen with an abdomen (a female, examined) is named as the Lectotype (present designation). Its label data are: – (1) "Museum Paris / Chili / Gay 15–43"; (2) "15 / 43" [circular]; (3) "Chrysopa

[Sic!] / flavescens / Blanch." [hand-written] (4) "LECTOTYPE / *Hemerobius flavescens* / Blanch. 1851; des. / C. A. Tauber '08" [red]. Three wings, the antennae and many legs are missing. Two of the other three types (paralectotypes) carry identical labels as the Lectotype; the third has label (1) the same as the Lectotype, and label (2) "19 / 43"; and label (3) "Hemerobius / flavescens / Blanch". All now carry paralectotype labels: "PARALECTOTYPE / *Hemerobius flavescens* / Blanch. 1851; det. / C. A. Tauber '08" [yellow]. All three specimens are without abdomens; one without wings; one without hindwings; one lacking forewings and one hindwing.

***Chrysopa nosina* Navás.** Although Navás (1913 **r#569**: 85) mentioned only one collection date in his original description, he did not state how many specimens he examined when he described *C. nosina*. Thus, the female in the MZB (examined) that Navás labeled as a type and that carries label data matching the original description is the Lectotype (present designation). Its labels read: (1) "Nos (Chili), Marzo 1910" [hand-written (Navás)]; (2) "Chrysopa nosina Nav. Navas S. J. det." [hand-written (Navás)]; (3) "Typus" [pink; hand-written (Navás)]; (4) "Type Chrysopa (Suarius) nosina Nav. ♀ det. P. Adams 74" [hand-written (Adams)]; (5) "LECTOTYPE, *Chrysopa nosina* Navás, des. C. A. Tauber '08" [red]; (6) "*Chrysopodes flavescens* (Blanchard), det. C. A. Tauber 2008"; (7) "78-1689 MZB". The abdomen is dissected (in a microvial with glycerin).

A second specimen in the MZB (female, examined, not dissected) from the same locality, but collected 15-11-10 is also labeled "Typus" [Navás' hand]; a fourth label in Adams' hand states: "Not the type; only 1 specimen mentioned in orig. desc. 'Marzo 1910'." It is not clear whether Navás examined this specimen when he prepared the description of *Chrysopa nosina*, so I did not label it as a paralectotype; it also is a *C.* (*N.*) *flavescens* (78-1690 MZB). A third specimen (examined) in the MZB, from Curacantín, Chile, was determined as *Chrysopa nosina* by Navás and is labeled as "Cotypus" in Navás' hand; however, it was collected in 1919 (after the original description was published). It is a teneral male of *C.* (*N.*) *porterinus* (det. P. Adams '74; confirmed C. A. Tauber, 2008), and it bears a label, written by P. Adams in 1974, stating that the specimen was reported by Navás (1921a: 259). Two additional (non-type) specimens (examined) that were identified as *Chrysopa nosina* by Navás are in the MNHN (Legrand et al. 2008: 157); both are *C.* (*N.*) *flavescens*.

***Chrysopa jaffuelina* Navás.** A specimen labeled by Navás as the type of *C. jaffuelina* (examined) is in the MZB. Because the original description did not state whether Navás had more than one specimen, this specimen (female; abdomen dissected, in glycerin, in microvial on pin) is here designated as the Lectotype (present designation). Its labels are as follows: (1) "Los Perales, Chile, I.1918"; (2) "Chrysopa jaffuelina Nav. P. Navás S. J. det."; (3) "Typus"; (4) "LECTOTYPE, *Chrysopa jaffuelina* Navás, desig. C. A. Tauber, 2008" [red]; (5) "*Chrysopodes flavescens* Blanch., det. C. A. Tauber 2008"; (6) "78-1697 MZB". There is another specimen (examined), in the MNHN, that Navás studied; it was not mentioned in the original description and is not part of the type series (Legrand et al. 2008 [2009]: 144).

***Chrysopa bullocki* Navás.** There are two syntypes of *C. bullocki* in the MZB (examined). They each have labels that read: (1) "Angol / (Chile) / 10.1.32" [hand-print-

ed, Navás]; (2) "Chrysopa / Bullocki Nav. / P. Navás S. J. det." [hand-printed, Navás, printed]; (3) "Typus" [red]. One of the specimens, a slightly teneral female, is chosen as the Lectotype (present designation). It has three additional labels: (4) "78-1701 MZB"; (5) "LECTOTYPE / *Chrysopa bullocki* / Navás, desig. / C. A. Tauber 2008" [red]; (6) "*Chrysopodes flavescens* / (Blanchard) / det. C. A. Tauber 2008". The second specimen, a male dissected by Adams in 1974, has four labels that differ from those on the lectotype: (4) "abd. in glycerine, prep. P. Adams 1974"; (5) "78-1985 MZB"; (6) "PARALECTOTYPE, *Chrysopa bullocki* Navás, desig. C. A. Tauber 2008"; (7) "*Chrysopodes flavescens* (Blanchard), det. C. A. Tauber 2008". Adams' notes indicate that the genitalia of this specimen were teneral, but in reasonably good condition when he examined it in 1974. However, when I examined it in 2008, parts of the abdomen and the genitalia were missing.

Specimens examined (in addition to type material listed above). **ARGENTINA. Neuquén:** Ao Aucapan, 7 km. S. Pilolil, II/27/1978, C. M. & O. S. Flint, Jr. (1M, USNM); Ao. del Gato, 8 km. S. Rahue, III/2/1978, C. M. & O. S. Flint, Jr. (5M, 6F USNM); Pucara, XI/1957 (2M, CAS), I/1956, L. E. Pena (1F, CAS); II/1960, L. E. Pena (1M, CAS); San Martin de los Andes, XII/19/1954 (1M, CAS-PAA), 1/1958, H. J. Molinari (1M, CAS, determined as a new sp. by P. A. Adams). **CHILE. Araucanía Region:** Angol, II/1/1938, D. S. Bullock (1F, USNM); Angal [= Angol?], Cerda (coll.), II/11/1953 (1M, AMNH). **Atacama Region:** Chamonate, W. Copiapo, X/4/1980, L.E. Pena (1F, 1M, teneral, 1? CAS); Copiapo, 1600m, X/2/1980, L. E. Pena (1F, CAS); Juntas (Copiapo), 1600m, X/2/1980, L.E. Pena (1F, CAS); El Transito, X/25/1980, L. E. Pena (1M, 4F, CAS); W. Vallenar a. Maitencillo, X/11/1980, L. E. Pena (3M, 3F, 1?, CAS); Atacama, SE Vallenar Pinte, 1600 m, X/25/1980, L. E. Pena (2F, CAS); Quebrada, Algodon, Nr Carrisal Bajo Atacama, III/24/1954, L. E. Pena (2F, CAS). **Bíobío Region:** Arauco, 5 km. W. Tucapel, XII/23/1950, XII/28/1950, Ross & Michelbacher (1M, 3F, CAS); Arauco, Contulmo, II/1/1953, L. E. Pena (1M, CAS); Ñuble, Rio Teno, I/25–27/1968, L. E. Pena G. (1M, USNM); Rio Huequecura, 350 m, 37°42'S, 71°45'W, at light, XI/31/1998-I/1/1999, DD Judd & AVZ Brower (1F, OSU); Ñuble, Alto Trequalemu, 500 mtrs, ca. 20km. SE. Chovellen, I/26–27/1979, D. & M. Davis & B. Akerbergs (2M, USNM); Ñuble, Recinto, I/1955, L. E. Pena, leg. (22M, 8F, CAS); Chillan, Recinto, I/1979, L. E. Pena (1M, CAS); Ñuble, Atacalco, nr. Diguillin R., I/22/1955, L. E. Pena, leg. (1M, 6F, CAS); Ñuble, Las [transos?], I/22/1955, L. E. Pena, leg. (1F, CAS); Sta. Barbara, II/4/1959, L. E. Pena (1F, teneral, CAS). **Coquimbo Region:** Elqui, 11 km S. Vicuña, X/26/1992, Rozen, Sharkov, Snyder (1F, AMNH); 12 mi. E. Vicuna, XII/4/1950, Ross & Michelbacher (1M, CAS); Rio Turbio, X/28/1957, L. E. Pena (1F, CAS); Rivadavia, X/24/1940, L. E. Pena (3F, CAS); Vicuna, nr. irrigat. ditch, XI/30/1976, at light, Gurney & Barria (1M, USNM); Elqui, 20 mi. E. of La Serena, XII/3/1950, Ross & Michelbacher (5F, 5M, CAS); 50 km. S Serena, XII/1/1950, Ross & Michelbacher (3M, 8F, CAS); Quero, Los Vilos, I/1984, L. E. Pena (1F, teneral, 1?, CAS, det. N. Penny); 15 mi. S Los Vilos, XII/13/1940, Ross & Michelbacher, (1M, teneral, 1F, teneral, CAS); Samo Alto, XI/2/1957, L. E. Pena (5M, 5F, 3?, CAS); Talcuna, X/15/1958, L. E. Pena (1F,

CAS); 10 km. E. Fray Jorge Natl Pk, XII/28/2966, dry wash, M. E. Irwin (1M, CAS); Fray Jorge Natl Pk, 15 km. NW Pachingo, 100–200 m, X/20/1966, E. I. Schlinger (1M, CAS). Limari, 20 km N Combarbala, XI/20/1959, L. E. Pena (1M, CAS). **Maule Region:** Curicó, Rio Teno, 1300m, II/7–14/1965, L.E. Peña (25M, 23F, CAS); Curicó, El Buchen, Cord. II/12/1956, L. E. Pena (2F, CAS); Curico, Rio Tono, II/7–14/1965, L. Peña (1M, CAS); Linares, Fundo Malcho, XII/1952, L. E. Pena (3M, 9F, CAS); Linares, Tranque de Bullileo, 800m, I/10–12/1979, D. & M. Davis & B. Akerbergs (1M, USNM); Carrizalillo, 250m, I/30-II/5/1981, L. E. Peña (1F, USNM); Cayuranquil, 400m, W. Cauquenes, I/23–31/1981, L. Peña (1M, USNM); Linares, Hornitos, 750 m, I/5/1986, P. Mazry (1M, 5F, SDNHM); 20 km. S. Linares, XII/3/1990, P. Mazry (1M, 1F, SDNHM); Maule, 22 mi. N.Talca, XII/22/1950, Ross & Michelbacher (1M, 2F, CAS); Tranque de Bulleo, I/1–12/1979, 800 m, D. & M. Davis & B. Akerbergs (1F, USNM); Trequalemu, 600 m, I/27/1979, L. E. Pena (1F, 2?, CAS, det. M. Penny). **O'Higgins Region:** La Leonera, II/1/1953, XII/30/1954, L. E. Pena (2F, CAS); La Leonora, Graneros, II/12–13/1986, L. E. Pena (1M, teneral, 1F, CAS); El Manzano, 1000 m, IX/11/1951, I/9/1951, L. E. Pena (2F, CAS). **Santiago Region:** Conchali, XI/19/1978, L. E. Pena (1F, CAS); El Alfalfal, II/29/1968, Flint & Pena (10M, 3F, USNM); El Manzano, nr. San Jose de Maipo, XII/19/1976, Gurney & Barria (1M, USNM); El Peumo, nr. river, XII/18/1976, Gurney & Barria (1M, 1F, USNM); Guayacan, L. E. Pena, VI/2/1946 (1F, CAS), XII/1948 (1F, CAS); Guayacan, Santiago, VI/2/1946, III/1951, L. E. Pena (2F, CAS); Colina, III/1980, L. E. Pena (2M, 2F, 4? CAS); Portezuelo, 7 km N Santiago, 500 m, X/22–25/1981, D. & M. Davis (2F, USNM); Santiago, XI -XII/1952, M. Cerda (3M, 1?, AMNH), XII/19/1979, L. E. Pena (1?, CAS); Santiago Cordillera, Rio Colorado, III/2/1989, R. Miller & L Stange (1F, FSCA); Rio Colorado, Santiago, IV/10/1953, L. E. Pena (2M, CAS); nr. L. Rapel, XII/19/1976, Gurney (1M, 1F, USNM); La Reina, XIII/28/1947, L. E. Pena (1F, CAS); Cerro las Viscaches, 1250 m., XII/8/1951, P. C. Hutchison (1F, CAS); Santiago Prov., Queb de La Plata 510m, Fundo Rinconada, Maipú 33°31'S, 70°47'W, malaise, III/9/1966, M. E. Irwin (1F, CAS); Valle de Ramon, II/1955, L. E. Pena (8M, 4F, CAS); Valle Ramon, 1000 m, II/21/1955, L. E. Pena (1M, 3F, CAS). **Valparaíso Region:** Valparaiso, IV/7/12 (1F, MNHN, det. as *Chrysopa nosina* by Navás; det. as *Chrysopodes* (*Neosuarius*) *flavescens* by Adams '84); La Cruz, IX/26/63, X/6–9/1964, X/28/1965, J. Aranda R (3M, 3F, CIS); Est. Marga-Marga, nr. Perales, III/9/1968, Flint & Pena (2F, USNM); Margo Margo, IV/14/1951, L. E. Pena (1M, CAS); Aconcaqua, El Tartaro, II/4–6/1984, L. E. Pena (2M, CAS); Aconcagua, Guardia Vieja, XII/26–18–1986, D. Pendleton (1F, SDNHM), XII/6/1961, Peña (1F, CAS); Acgua.: Rio Branco, III/10/1968, Flint & Pena (4 M, USNM). Chile, E. C. Reed (1M, 1F, USNM): 10 km. E. Zapudo, XI/28/1950, Ross & Michelbacher (3M, 1 teneral, 1F, CAS).

Known distribution. Argentina, Chile.

Variation. The degree of sclerotization and invagination of the ventral region of the ectoproct varies considerably among male specimens, In mature, well developed individuals, the invagination is relatively large, triangular, and heavily sclerotized; in

teneral and lightly sclerotized individuals, the invaginated apodeme is absent or small, and the posteroventral region of the ectoproct has a finger-like projection bearing a tuft of setae mesally on the ventral margin.

A small proportion of specimens with *C.* (*N.*) *flavescens*-like terminalia express varying degrees of *C.* (*N.*) *porterina*-like external characteristics (color and sclerotization). In one case, there are two such unusually dark, male specimens among a fairly large number of *C.* (*N.*) *porterina* from San Martín de los Andes, Neuquén, Argentina (CAS); Adams identified one as a "n. sp. nr. *porterina*". Similar specimens are a male from Pucara, Neuquén, Argentina (CAS), and a female from La Leonera, O'Higgins, Chile (CAS). The wing venation appears dark [as in *C.* (*N.*) *porterinus*], the specimens are very oily and the body and wings appear to have been discolored. However, they have a dark brown stripe on the dorsal surface of the scape, the flagellum is dark brown throughout, and the brown stripe on the midline of the pronotum is narrow – all characteristics that are typical of *C.* (*N.*) *flavescens*. The genitalia are like those of some teneral or very lightly sclerotized *C.* (*N.*) *flavescens*; e.g., in the males the apodeme along the ventral midline of S8+9 is absent and the dorsal arm of the apodeme on T9+ectoproct is weak, but the gonarcus is *C.* (*N.*) *flavescens*-like.

Chrysopodes (Neosuarius) nigricubitus Tauber and Tauber, 2010

Figs 40c, 41c, 56, 57c, 58, 59a, 64b

Chrysopodes (*Neosuarius*) *nigricubitus* Tauber and Tauber, 2010: 60 [CAS, Holotype (by original designation): "Ecuador, Galápagos Archipelago, Isla Santa Cruz, Table Mountain, 440 meters (D. Q. Cavagnaro)"].

Diagnosis. The three *Chrysopodes* species that are endemic to the Galápagos Islands – *C.* (*Neosuarius*) *nigripilosus*, *C.* (*N.*) *nigricubitus* and *C.* (*N.*) *pecki* – are distingished from the mainland species by their slightly smaller size (forewing length: 10.2–13.7 mm, vs. 13.9–16.7 for the mainland species), tan to brown bodies with mottled spots (not streaks) of dark brown; brown vertex, and brown to dark brown facial markings. The males have elongate, setose ducts (probably glandular) that originate within the gonosaccus (immediately below the mediuncus) and extend into the gonarcal region (Fig. 58; also see Fig. 10 in Tauber and Tauber 2010), and large, eversible pouches above the tip of S8+9 (Fig. 61c).

Chrysopodes (*Neosuarius*) *nigricubitus* Tauber and Tauber is one of two species of endemic *Chrysopodes* (*Neosuarius*) recently described from the Galápagos Archipelago [see *C.* (*N.*) *nigripilosus*]. Currently it is known from two islands: Santa Cruz (Table Mountain and Horneman Farm) and Pinta (420'). In general appearance, the adults share many features with the more common species, *C.* (*N.*) *nigripilosus*; i.e., they have small, robust, brownish bodies, similar head and wing markings.

The most distinguishing characteristic of *N. nigricubitus* is the suffusion of black or dark brown pigment (coloration) around several of the crossveins in the forewings,

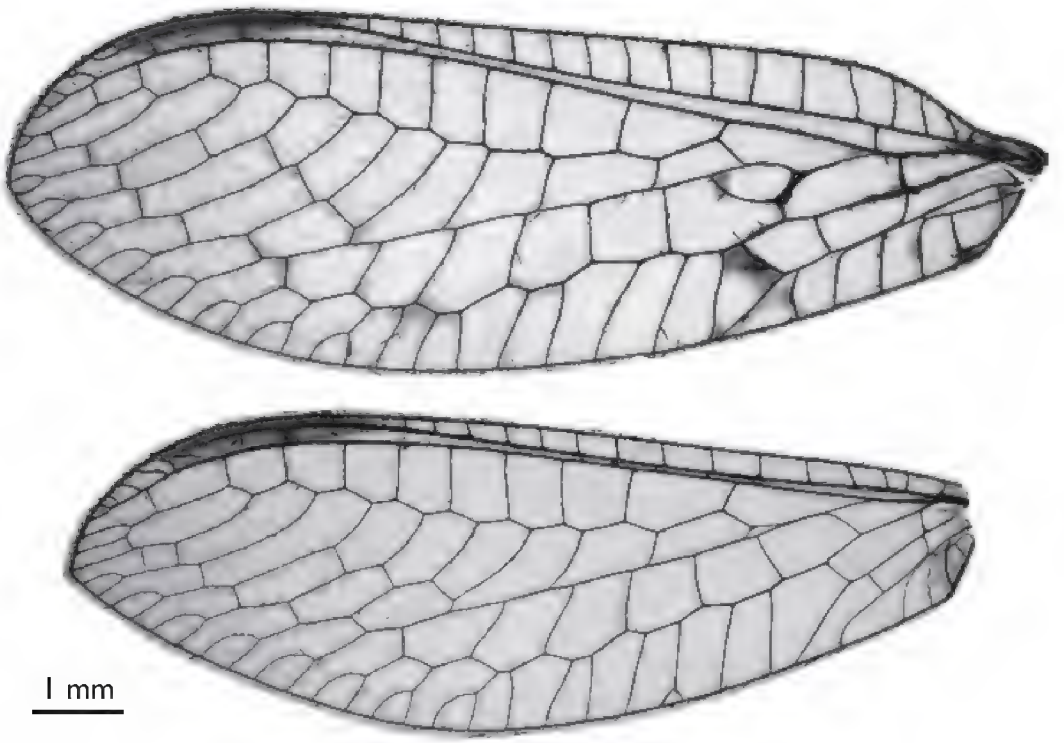

Figure 56. *Chrysopodes* (*Neosuarius*) *nigricubitus*: Forewing, hindwing (Ecuador, Galápagos Archipelago, Santa Cruz Island).

most notably the second intracubital crossvein (Fig. 56). This diffusion is absent from *C.* (*N.*) *nigripilosus* and much less marked in *C.* (*N.*) *pecki* (Figs 60, 63). The second intracubital crossvein is also arched, crassate and bears a large swelling that is absent from *C.* (*N.*) *nigripilosus* and much smaller in *C.* (*N.*) *pecki*. In addition, there are slight, but consistent differences between the species in the lengths of the pronotum and tergite 6; in *C.* (*N.*) *nigricubitus,* the pronotum is longer, the pronotal W : L ratio is higher, and L:W ratio of the T6 is longer than it is in *C.* (*N.*) *nigripilosus*, but it is shorter than that in *C.* (*N.*) *pecki* (see Table 2 in Tauber and Tauber 2010). Also, the abdominal sternites of the *C.* (*N.*) *nigricubitus* females are without brown markings (Fig. 57c), whereas on *C.* (*N.*) *nigripilosus* (S5-S7) and *C.* (*N.*) *pecki* (S5) females they are present (Figs 57b, d).

C. (*N.*) *nigricubitus* males have abdominal sclerotization and genitalia that are very similar to those of *C.* (*N.*) *nigripilosus*. However, there is one notable difference: unlike *C.* (*N.*) *nigripilosus,* in which the lateral arms of gonarcus are directed downward next to the mediuncus, in *C.* (*N.*) *nigircubitus* the gonarcal arms are spread widely, only the tips of the gonarcal arms bend downward, and the gonarcal structure is relatively flat in lateral view (Fig. 58b). The female internal genital structures are very similar to those of *C.* (*N.*) *nigripilosus* and *C.* (*N.*) *pecki;* i.e., the spermatheca is elongate and tubular; the spermathecal duct is short and lightly sclerotized; the bursa is large and leathery; the bursal glands are bulbous and they bear elongate accessory ducts (Tauber and Tauber 2010). However, the external structure of the subgenitale distinguishes females of the three species (see Fig. 59).

Description. Available in Tauber and Tauber (2010).

Larvae. Unknown.

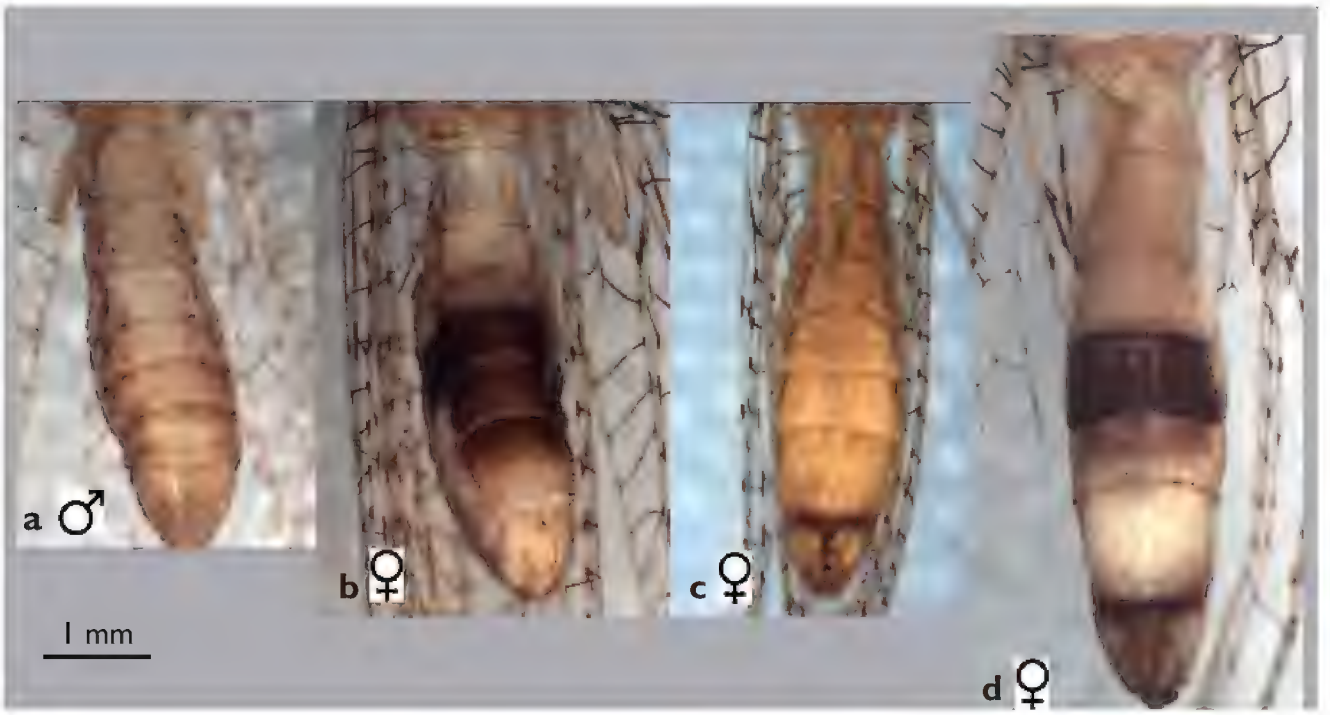

Figure 57. Abdomens, ventral. **(a)** *Chrysopodes* (*Neosuarius*) *nigripilosus* male **(b)** *Chrysopodes* (*Neosuarius*) *nigripilosus* female **(c)** *C.* (*N.*) *nigricubitus* female **(d)** *C.* (*N.*) *pecki* female. The scale applies to all images.

Eggs. Unknown.

Biology. Unknown. Large grains of pollen were in the guts of some males and females. Adult specimens were collected in February, April and May.

Type material. ***Chrysopodes (Neosuarius) nigricubitus* Tauber & Tauber.** The holotype (a male) and 18 paratypes (6 males, 10 females, 2 unknown sex) from two localities on Santa Cruz Island are in the California Academy of Sciences. The holotype is labelled: (1) "Galapagos Arch. / Isla SantaCruz / Table Mtn. 440M. / IV-16–1964"; (2) "D. Q. Cavagnaro / Collector"; (3) "Image: C. A. Tauber / Table.M.#7 / head,thor,ab"; (4) "HOLOTYPE ♂ / *Chrysopodes* (*Neosuarius*) / *nigricubitus*; des. Tauber / & Tauber, 2010" [red]. Thirteen paratypes (3 males, 8 females, 2 unknown sex) have identical labels (1) and (2); some also carry label (3) "Image: C.A.Tauber …"; all carry label (4) "PARATYPE / *Chrysopodes* (*Neosuarius*) / *nigricubitus;* det. Tauber / & Tauber. 2010" [yellow]. Five paratypes (3 males, 2 females) are from the second locality on Santa Cruz Island; they bear the following labels: (1) "Galapagos Arch. / Isla SantaCruz / HornemanFarm / 220M V-7–1964"; (2) "D. Q. Cavagnaro / Collector"; (3) "PARATYPE / *Chrysopodes* (*Neosuarius*)/ *nigricubitus;* des. Tauber / & Tauber, 2010" [yellow].

There are an additional nine paratypes (4M, 5F) in the Institut royal des Sciences naturelles de Belgique, Brussels (IRSNB). These specimens are in alcohol, and their printed labels read: (1) "Ecuador, Galápagos, Pinta, western side of island, 420 m, 30/II/2000, L. Baert, K. Desender & J.-P. Maelfait, B.00/0100"; (2) "PARATYPE / *Chrysopodes* (*Neosuarius*) *nigricubitus* Tauber & Tauber, des. 2010".

Specimens examined. Type material only.

Known distribution. Endemic to the Galápagos Islands (known only from two localities on Santa Cruz Island).

Variation. The variation in the known specimens is slight. See Tables 1 and 2 in Tauber and Tauber (2010) for the ranges in head and body size and wing features.

Chrysopodes (Neosuarius) nigripilosus (Banks, 1924)

Figs 40d, 41d, 57a, b, 59b, 60–62, 64a, c

Chrysopa nigripilosa Banks, 1924: 177 [AMNH, Lectotype (by present designation): "South Seymour, Galapagos Islands, April 20, 23, 1923"]. Linsley and Usinger 1966: 140 [distribution records]; Parkin et al. 1972: 102 [collection records]; Linsley 1977: 19 [distribution records]; Penny 1977: 19 [species list]; Klimaszewski, McE. Kevan and Peck 1987: 3032 [summary of collection records].

Chrysopodes (*Neosuarius*) *nigripilosus* (= *nigripilosa*) (Banks, 1924). Brooks and Barnard 1990: 272 [species list, transfer to *Chrysopodes* (*Neosuarius*)]; Baert, Desender and Peck 1992: 145 [distribution records, as *Neosuarius nigripilosa*]; Peck 2001: 273 [species list, distribution, as *Chrysopodes nigripilosa*]; Oswald 2007 [catalog listing]; Tauber and Tauber 2010: 50 [redescription, intraspecific and interspecific variation].

Diagnosis. *Chrysopodes* (*N.*) *nigripilosus* is the most commonly collected *Chrysopodes* species on the Galápagos Islands; it is known from six islands. The most notable differences between this species and the other two from the Galápagos Islands are: (a) *C.* (*N.*) *nigripilosus* forewings (Fig. 60) do not have suffusions of black or dark brown pigment on the membrane; (b) there are three to four crossveins between the Subcosta and Radius, below the stigma; (c) the cubital veins and crossveins (including icux2) are unmodified (i.e., they are not bent, crassate or enlarged). In the *C.* (*N.*) *nigripilosus* male, the gonarcal arms extend downward, not outward (Fig. 61); the eversible pouches at the tip of S8+9 are large and well separated by a flat area (Fig. 61c; also Figs 7, 8 in Tauber and Tauber 2010). In the female, the terminal sternites [S5, S6, S7 (basal or entirely)] are dark brown (Fig. 57b); the spermathecal duct is short and lacks tight coils; the bursal glands are large and globose, and their accessory ducts may be branched (Figs 12–14 in Tauber and Tauber).

Description. Available in Tauber and Tauber (2010).

Larvae. Unknown

Eggs. Unknown.

Biology. Pollen was found in the guts of several specimens (also reported by Brooks and Barnard 1990: 213). Adult specimens were collected in all months from January through October (see Banks 1924: 179; Parkin et al. 1972: 102, Baert et al. 1992: 145; Peck 2001: 273, specimens listed below)

One female specimen (from Santa Cruz Island) provided insight into the functional morphology of the subgenitale. In this specimen, the genital pore is open, the membranous fold at the base of the subgenitale is extended outward, and the knob-like tip of the subgenitale is extruded. It had entered an external spermatophore, which was attached to the specimen (and which dissolved or was lost in the maceration of the

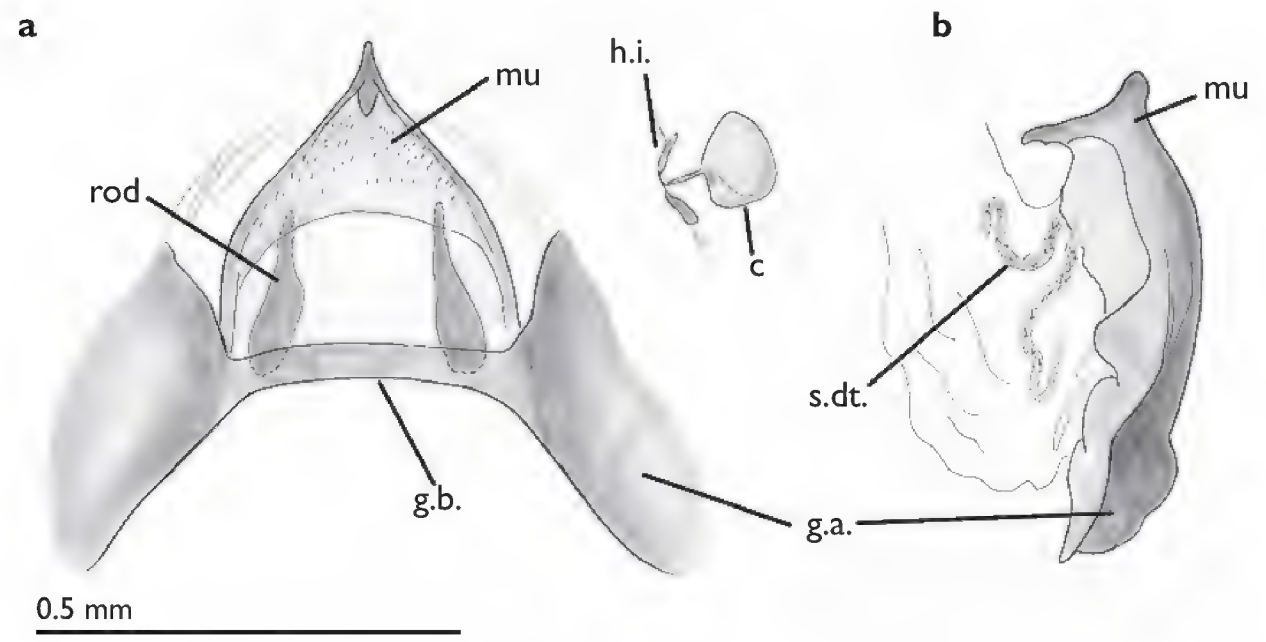

Figure 58. *Chrysopodes* (*Neosuarius*) *nigricubitus*: Male genitalia, **(a)** gonarcus (dorsal) with hypandrium internum on right (dorsal) **(b)** gonarcus (lateral) **c** combes **g.a.** gonarcal apodeme **g.b.** gonarcal bridge **h.i.** hypandrium internum **mu** mediuncus **rod** internal rod of mediuncus **s.dt.** setose duct on gonosaccus.

abdomen in potassium hydroxide) (Fig. 62). The spermathecal duct extends into the base of the subgenitale and the tubular opening of the spermatheca faces posteriorly. It appears that the female everts the subgenitale during or after copulation and that the structure has a role in (a) holding the spermatophore to the genital opening and/or (b) gathering sperm or other substances from the spermatophore.

Type material. ***Chrysopa nigripilosa* Banks.** In this original description Banks indicated that the type(s) were in the "collection of the N. Y. Zoological Society"; he did not specify how many specimens were in the type series, but his description is consistent with more than one. One syntype was found in the AMNH and four in the MCZ. The male that is in the AMNH and that carries a "type" label, appears to be the one that Banks considered the primary type; it is hereby designated as the Lectotype (present designation). Its labels read: (1) "South Seymour / Galapagos / April 23 1923"; (2) "Williams Galapagos Exped., / Dept. of Tropical Research, / N. Y. Zoological Society, / William Beebe, Director"; (3) "Gift of New York / Zoo. Soc., Dept. / Tropical Research / William Beebe, Dir."; (4) "Chrysopa / nigropilosa [Sic!] / type Bks." [white, red border; hand-written (Banks)]; (5) "LECTOTYPE, *Chrysopa nigripilosa* / Banks 1924 / des. C. Tauber, 2010" [red].

This specimen, the lectotype, is teneral. It has a mediuncus that is characteristic of the other specimens, but the gonarcal arms are barely formed, the glandular ducts are visible only in the region of the gonarcal arms, not in the mediuncus, and the eversible pouches are small and withdrawn.

The four specimens in the MCZ (examined) are identified as paralectotypes and are labeled as follows: (1) "So Seymour Isl. / Galapagos Islds. / 20 April 1923 / Am. Mus. Exped." [hand printed, Banks?]; (2) "Type 15055" [red]; one specimen bears a label (3) "Chrysopa / nigripilosa paratype Bks" [white and red red border; hand -written (Banks)]; (4) "PARALECTOTYPE, *Chrysopa nigripilosa* Banks, det. C. A. Tauber, 2009" [yellow, printed].

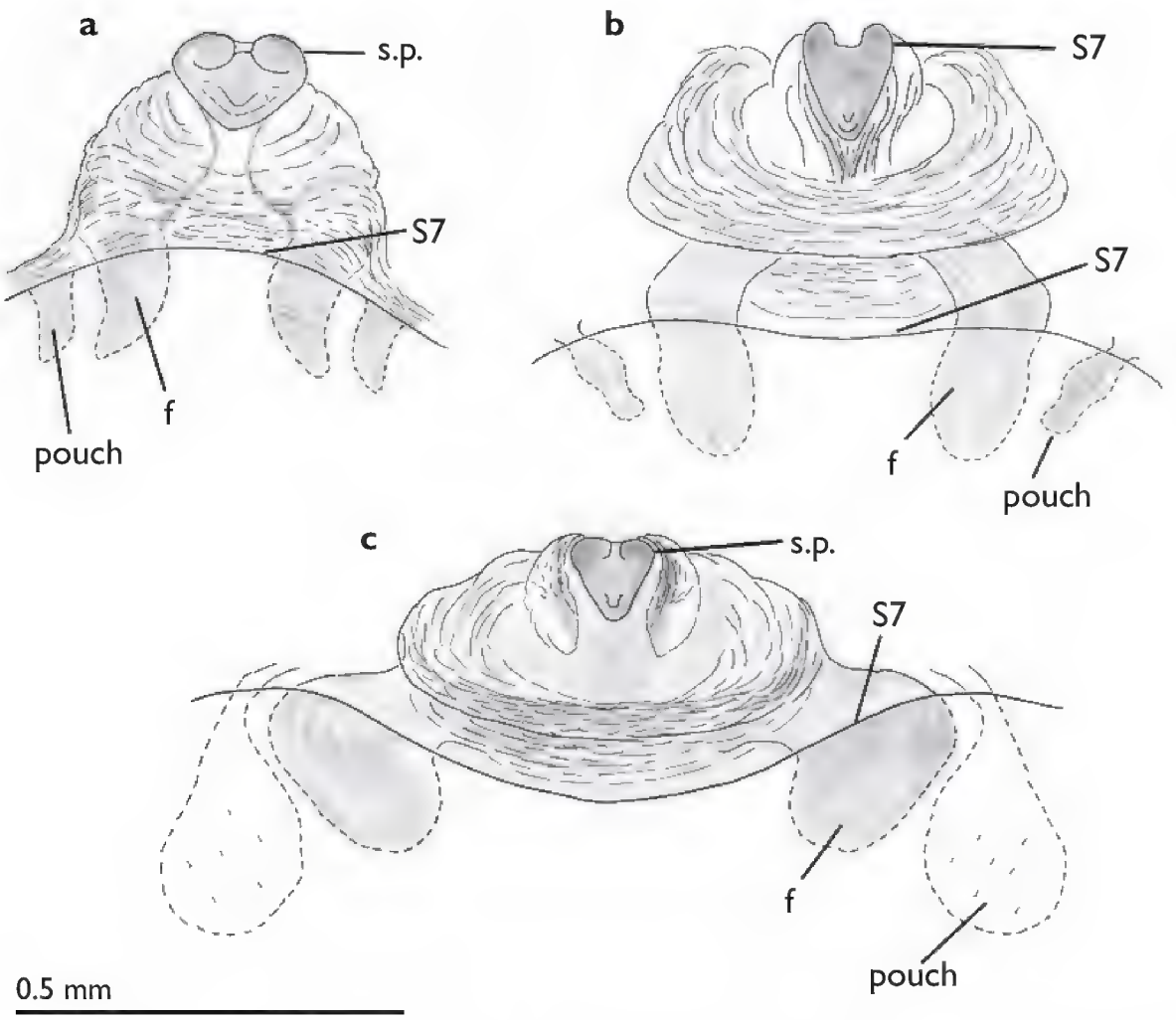

Figure 59. Female subgenitale, (posterior): **(a)** *Chrysopodes* (*Neosuarius*) *nigricubitus* **(b)** *Chrysopodes* (*Neosuarius*) *nigripilosus* **(c)** *Chrysopodes* (*Neosuarius*) *pecki*: **f** membranous fold on lateral margin of subgenitale **pouch** invaginated, membranous pouch lateral to the body of the subgenitale **s.p.** sclerotized distal process of subgenitale **S7** tip of seventh sternite.

Specimens examined (in addition to the type material). **ECUADOR. Galápagos Archipelago. Baltra** (= South Seymour). 30 m, S. Peck, I/24/1989, arid zone, grass+Bursera Forest, UV light, 89–4 (2M, USNM); 10 m, I/23/1989, S. Peck, arid zone, Bursera Forest, UV light, 89–5 (1F, USNM), beating or on ground, 89–12 (1M, USNM). **Santa Cruz** (= Indefatigable). CDRS, Arid zone, II/5–9/1989, dung tp., B. J. Sinclair (1F, USNM); Academy Bay, II/17/1964, P. D. Ashlock, (1M, 1F, BPBM); 0–100 m IX/1970, J. & M. Sedlacek (2F, BPBM); Academy Bay, Darwin Research Station, I/25-II/27/1964, D. Q. Cavagnaro & R. O. Schuster (3M, 11F, CAS), III/21/1964, D. Q. Cavagnaro (1M, CAS), I/30/-IIII-20/1964, R. O. Schuster (30M, 13F, CAS), I/21-II/1/1964, E. G. Linsley (2M, 1F CAS); CDRS, X/12–27/1968, Edin. Univ. Exped 1969.71 (4F, 2?, NSM, det. A. R. Waterston, 1970). **Isabela** (= Albemarle). nr, Punta Tortuga N, of Tagus Cove, I/28–30/1967, edge of mangrove swamp, among *Bursera graveolens*, I. L. Wiggins (1M, CAS); Puerto Villamil, MVL, III/2/1989, B. Laudry (1M, 1F, USNM); V. Alcedo, arid zone, 200m, Palo Santo woodland uv light, IV/3/1996, S. Peck, 96–78 (1M, 1F, USNM); V. Wolf, summit arid z, 1700m, sweeping shrubs, V/21/1996, S. Peck, 96–201 (1F, USNM); Beagle Crater, 3 m. (beach), III/25/1988, 4 m. (beach), III/23/1988, L. Baert, K. Desender & J.-P. Maelfait (6M, 2F, IRSN, Sample #B.88/0478; alcohol); Volcán Wolf, 4 m. (beach), III/20/1988, L. Baert, K. Desend-

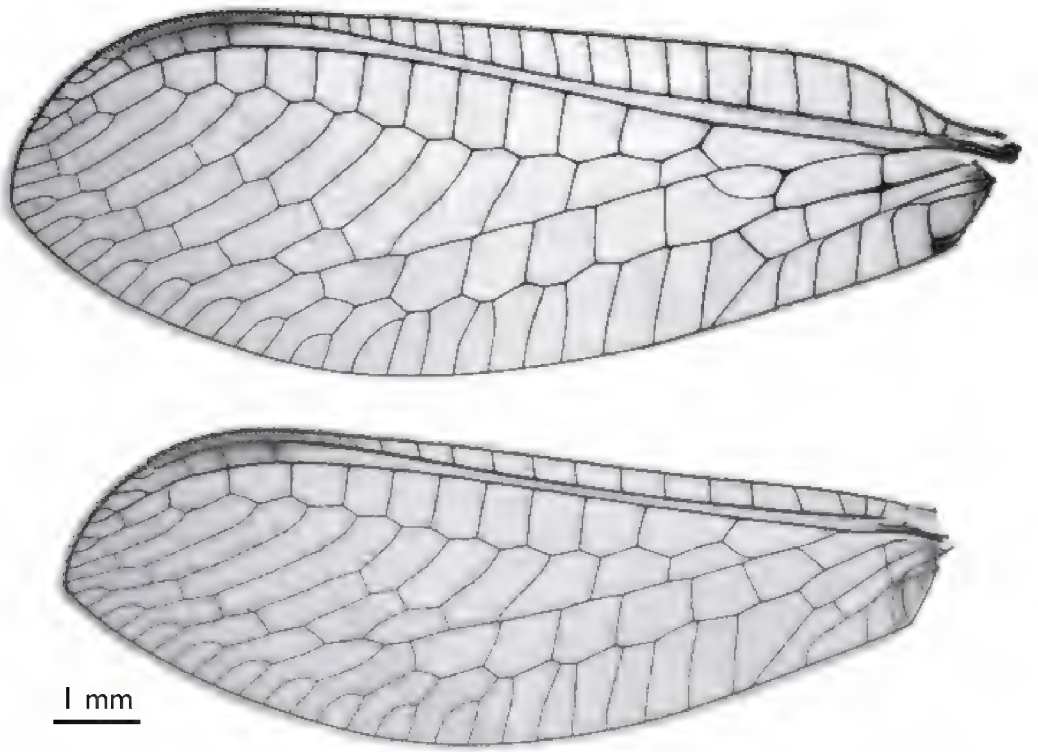

Figure 60. *Chrysopodes* (*Neosuarius*) *nigripilosus*: Forewing, hindwing (Ecuador, Galápagos Archipelago, Isabela Island).

er & J.-P. Maelfait (2M, 5F, IRSN, Sample #B.88/0446; alcohol); Volcán Wolf, 4 m. (beach), III/23/1988, L. Baert, K. Desender & J.-P. Maelfait (11M, 8F, IRSN, Sample #B.88/0470; alcohol). **Fernandina** (= Narborough). W side, 1,100', II/5/1964, D. Q. Cavagnaro (2F, CAS); Beginning of encañada, V/4/1991, L. Baert, K. Desender & J.-P. Maelfait (1F, IRSN, Sample #B.91/0765; alcohol); Cabo Hammond, 5 m, V/12/1991, L. Baert, K. Desender & J.-P. Maelfait (4M, 2F, IRSN, Sample #B.91/0802; alcohol). **Santa Fe** (= Barrington). Lagoon, 400 m, IV/24/1991, L. Baert, K. Desender & J.-P. Maelfait (1F, IRSN, Sample #B.91/0722; alcohol). **Santiago** (= San Salvador, James). Settlement, IX/22/1968, Edin. Univ. Exped. 1969.70 (1F, NMS, det. A. R. Waterston 1970). [Note: Additional specimens from Santa Cruz Island are in the NMS.]

Known distribution. Endemic to the Galápagos Islands (reported from six islands).

Variation. Tauber and Tauber (2009: Tables 1, 3) described the geographic variation in detail.

Chrysopodes (Neosuarius) pecki, Tauber and Tauber, 2010

Figs 40e, 41e, 57d, 59c, 63, 64d, 65

Chrysopodes (*Neosuarius*) *pecki* Tauber and Tauber, 2010: 67 [USNM, Holotype (by original designation): "Ecuador, Galápagos Archipelago, Isla Isabela, Volcan Wolf, 4 km NE Puerto Bravo"].

Diagnosis. *Chrysopodes* (*Neosuarius*) *pecki*, the third endemic species of *Chrysopodes* (*Neosuarius*) from the Galápagos, is known only from two extinct volcanoes on Isabela

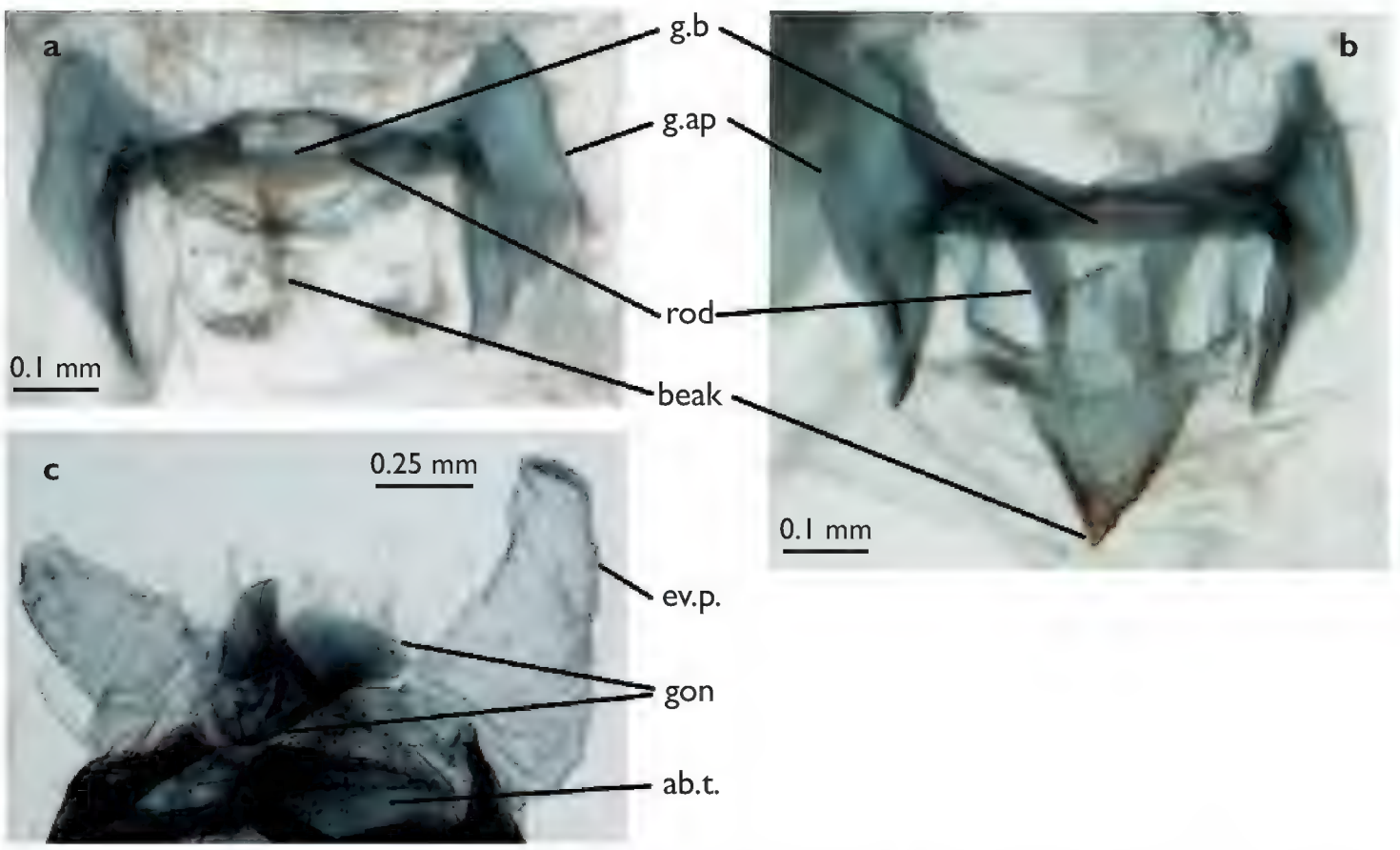

Figure 61. *Chrysopodes* (*Neosuarius*) *nigripilosus*: Male genitalia, **(a)** gonarcus (frontal view – beak forward, gonarcal apodeme behind) **(b)** gonarcus (dorsal view – rods forward, gonarcal apodemes behind **(c)** terminus of abdomen with eversible pouches everted (dorsal, with gonarcus rotated to lateral position). **ab.t.** abdominal terminus; beak, sclerotized beak at tip of mediuncus **ev.p.** eversible pouch **g.ap.** gonarcal apodeme (arm) **g.b.** gonarcal bridge **gon** gonarcus **rod** internal rod of mediuncus.

Island (Volcán Wolf and Volcán Alcedo), where it is sympatric with *C.* (*N.*) *nigripilosus*. The adults share many features with *C.* (*N.*) *nigripilosus* and *C.* (*N.*) *nigricubitus*, but they differ in having a pair of brown spots on the dorsum of the head, posterolateral to the vertex, elongate pronota (Fig. 40e). This species is the only one of the three Galápagos species that has forewings exceeding 13 mm in length. Like *C.* (*N.*) *nigripilosus*, the wings do not show dark suffusion around the crossveins. But like *C.* (*N.*) *nigricubitus,* the second cubital crossvein is very dark and it bears a dark brown swelling mesally; however, the swelling is smaller than that on most *C.* (*N.*) *nigricubitus* wings (Fig. 63; Tauber and Tauber 2010, Table 2).

Although the males of *C.* (*N.*) *pecki* closely resemble those of *C.* (*N.*) *nigripilosus* and *C.* (*N.*) *nigricubitus*, there are some distinguishing features (Fig. 65). For example, the gonarcus (length of arms, bridge width) is larger than that of either *C.* (*N.*) *nigripilosus* or *nigricubitus* (Tauber and Tauber 2010, Table 5). Second, as in *C.* (*N.*) *nigricubitus,* the horizonal apodeme along the ventral margin of T9+ectoproct is relatively straight, and it has a well sclerotized, unforked, pointed tip with a small ventral knob (Fig. 64d). Other differences were noted in the original description (Tauber and Tauber 2010).

Female *C.* (*N.*) *pecki* are distinguished by their very dark brown coloration on the fifth abdominal sternite, light brown pigmentation basally on S6, and cream coloration on the distal portion of S6 and all of S7 (Fig. 57d).

Description. Available in Tauber and Tauber (2010).

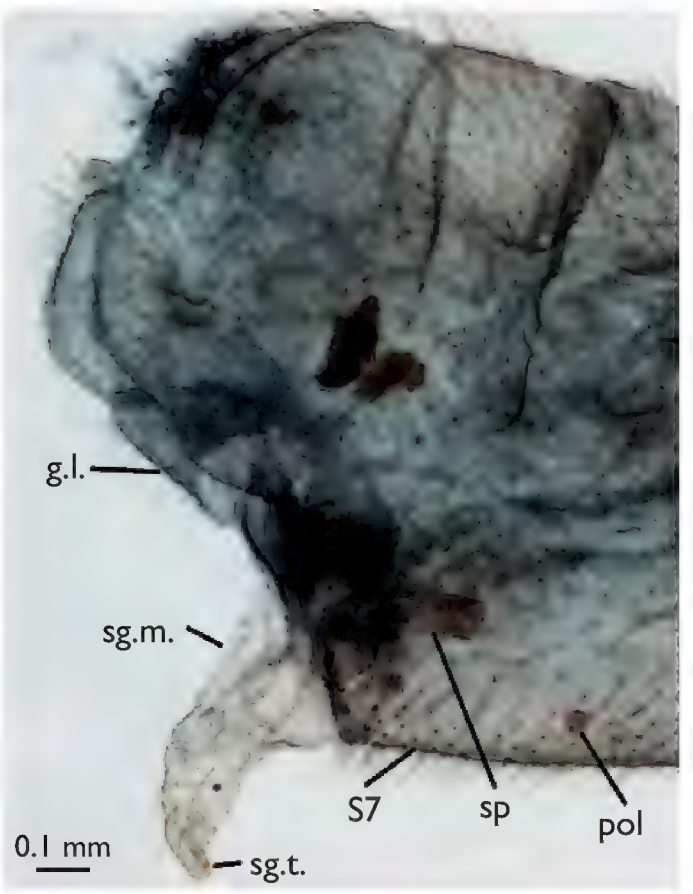

Figure 62. *Chrysopodes* (*Neosuarius*) *nigripilosus*: Female abdominal terminus with subgenitale extruded. **g.l.** gonapophysis lateralis **pol** typical pollen grain found in guts of *C.* (*Neosuarius*) *nigripilosus* **sg.m.** membranous base of subgenitale **sg.t.** sclerotized process at tip of subgenitale **S7** seventh sternite **sp** spermatheca.

Larvae, Eggs, Biology. Unknown. Adult specimens were collected in April and May.

Type material. ***Chrysopodes (Neosuarius) pecki* Tauber & Tauber.** The holotype (a male, pinned) is in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). Its labels read: (1) "ECU: Galáp: Isabela / V. Wolf, 4 kmNE. P. Bravo / humid for, 17.V.96 / uv light / S. Peck, 96–192"; (2) "HOLOTYPE / *Chrysopodes* (*Neosuarius*) *pecki* Tauber & Tauber, des. 2010" [red]. There are two paratypes (females, in alcohol) in the Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium (IRSN). Their labels read: (1) "Ecuador, Galápagos Arch., Isla Isabela, Volcán Alcedo, SE crater rim at "Geyser", 1000 m, 3/IV/1996, L. Baert, K. Desender & J.-P. Maelfait, B96/0074"; (2) "PARATYPE / *Chrysopodes* (*Neosuarius*) *pecki* Tauber & Tauber, des. 2010" [yellow].

Specimens examined. Type material only.

Known distribution. Two extinct volcanoes (Volcán Wolf and Volcán Alcedo) on Isabela Island (Galapagos).

Variation. Sample size very small.

Chrysopodes (Neosuarius) porterinus (Navás, 1910)

Figs 40f, 41f, 48c, 66–71

Chrysopa porterina Navás, 1910a: 47 [MZB, Holotype (by monotypy): "Chile. Porter leg."]. Navás 1910b: 70 [erroneously cited as a new species; description and figure

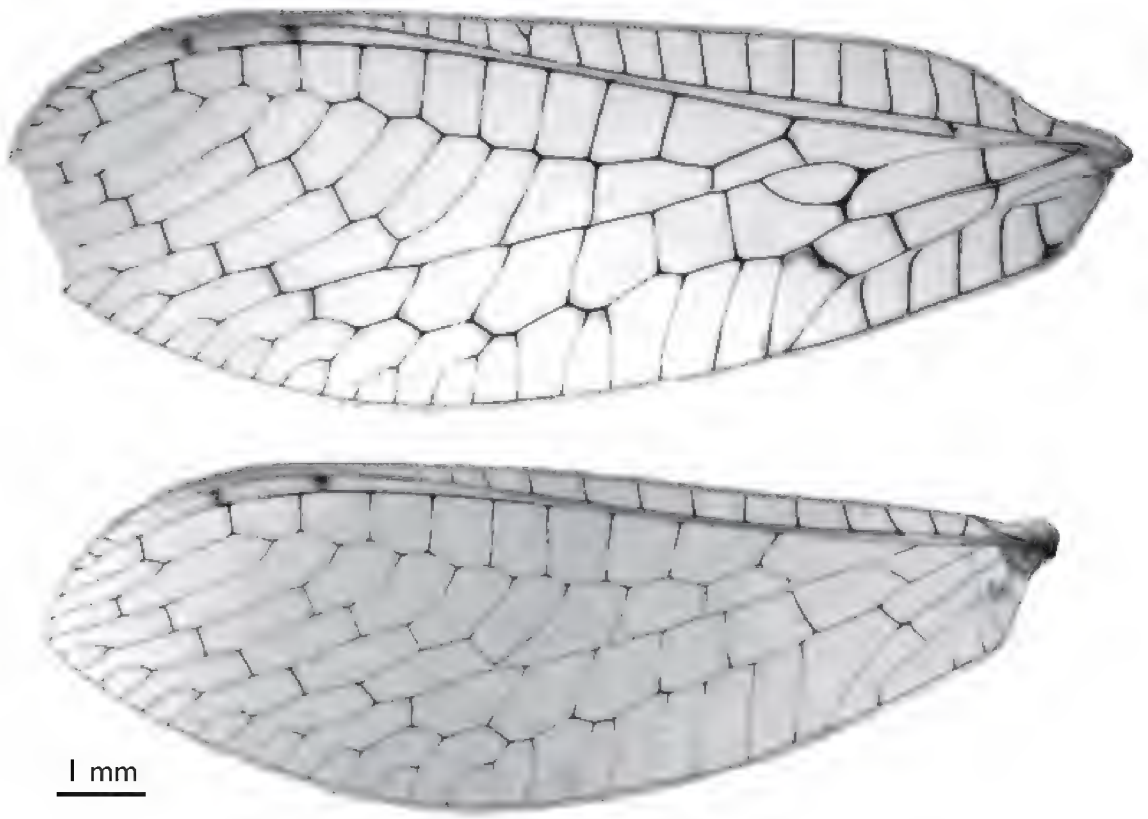

Figure 63. *Chrysopodes* (*Neosuarius*) *pecki*: Forewing, hindwing (Ecuador, Galápagos Archipelago, Isabela Island).

repeated]; Navas 1910c: 238 [redescription, distribution]; Navás 1913: 89 [redescription]; Navás 1925c: 305 [redescription]; Navás 1929b: 19 [distribution]; Penny 1977: 20 [species list]; Monserrat 1985: 238 [list of Navás types in Barcelona].

Chrysopa porteri Navás (misspelling). Navás 1928: 98 [distribution]; Penny 1977: 20 [species list].

Chrysopa tristella Navás, 1920: 35 [MNHN, Lectotype (by previous designation): "Chili, vallé de Marga. Marga. prés de Valparaiso, P. Jaffuel, leg. (Coll. M.)"]. Navás 1926: 326 [distribution]; Navás 1933a: 230 [distribution]; Brooks and Barnard 1990: 272 [transfer to *Chrysopodes* (*Neosuarius*)]; Oswald 2007 [catalog listing as *Chrysopodes* (*Neosuarius*) *tristellus*, nomenclature]. **New Synonym.**

Chrysopa ruizi Navas, 1934: 14 [SDEI, Lectotype (by present designation): "Chile: Choapa, II-1931; F. Ruiz; El Canelo, 7–23-II-1933; 15-IV-1932, Stuardo. B.-D."]. Penny 1977: 20 [species list]; Brooks and Barnard 1990: 280 [species list, as " *'Chrysopa' incertae sedis*"]; Oswald 2007 [catalog listing]. **New Synonym.**

Chrysopodes (*Neosuarius*) *porterinus* (= *porterina*) (Navás). Adams and Penny 1985 [1987]: 436 [transfer to *Chrysopodes* (*Neosuarius*)]; Brooks and Barnard 1990: 213, 272 [drawing of wing, species list]; Monserrat and Freitas 2005: 171 [redescription of adult, larval description]; Oswald 2007 [catalog listing, nomenclature].

Diagnosis. *Chrysopodes* (*N.*) *porterinus* is one of several Andean species (including *C.* (*N.*) *flavescens, escomeli* and *figuralis*) in which the adults have robust, waxy bodies; like *C.* (*N.*) *escomeli* and *C.* (*N.*) *flavescens*, they are largely brownish with dark brown

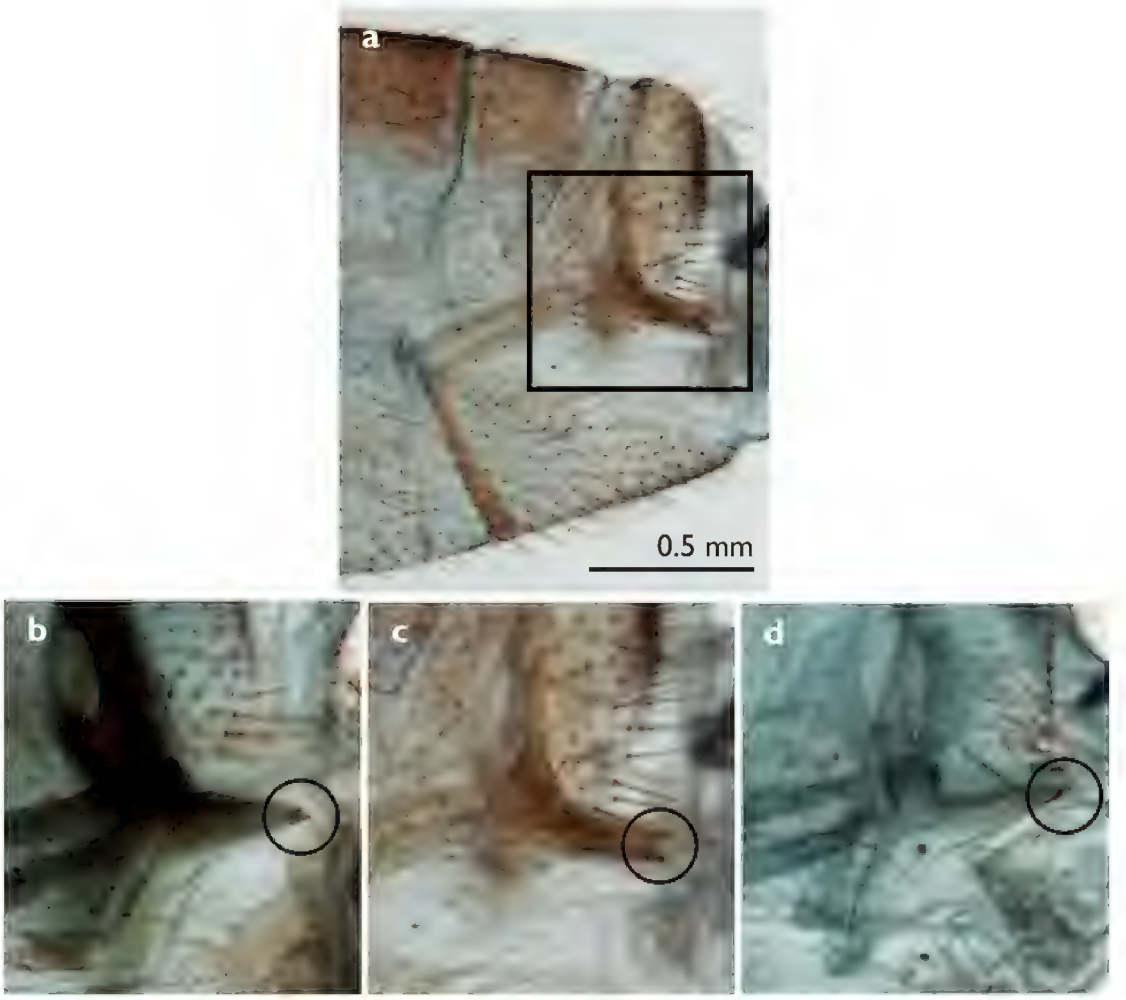

Figure 64. Male abdominal terminalia and enlarged views of the tip of the caudal arm on the T9+ectoproct apodeme: **(a)** *C.* (*N.*) *nigripilosus* terminus (box indicates enlarged area) **(b)** *C.* (*N.*) *nigricubitus* (caudal arm with single acute tip) **(c)** *C.* (*N.*) *nigripilosus* (caudal arm with bifurcated tip) **(d)** *C.* (*N.*) *pecki* (caudal arm with single acute tip bearing small ventral knob). The enlarged images were enhanced to highlight the caudal arms against the background.

marks. *C.* (*N.*) *porterinus* can often be separated from the other two species by its heavy prothoracic markings, lack of stripes on the scapes, and a flagellum that is dark brown to black basally and becomes lighter distally (Figs 40f, 41f).

The male genitalia, with its dome-like, almost spherical gonarcus, are particularly useful in distinguishing the species (Figs 67, 68). However, only a few, subtle differences distinguish the *C.* (*N.*) *porterinus* female genitalia from those of the other two species. In *C.* (*N.*) *porterinus*, the distal surface of the sclerotized process of the subgenitale is flat and roughly heart-shaped (with a lobe in each dorsal corner, tapering to a ventral apex) (Fig. 71). The neck at the base of the process is short (considerably shorter than the length of the terminal surface of the process), and it ends in an sharply angled connection to the distal process (Fig. 48c). Also, the membranous area ventral to the subgenitale is dense and folded, not clear and smooth, as in *C.* (*N.*) *flavescens*.

Description. *Head* (Figs 40f, 41f): Width (frontal, including eyes) 1.7–1.8 mm; ratio, head : eye width = 2.6–2.8:1; distance (straight-line) between tentorial pits 0.44–0.53 mm. Distance between antennae ~0.11–0.12 mm; length of frons (mid-antenna – midway between tentorial pits) ~0.44–0.57 mm; clypeus ~0.32–0.34 mm long. Antenna 0.7× length of forewing (10.8–11.0 mm). Vertex slightly raised, flat anteriorly, with very small, smooth, rounded posterior fold; surface of vertex smooth,

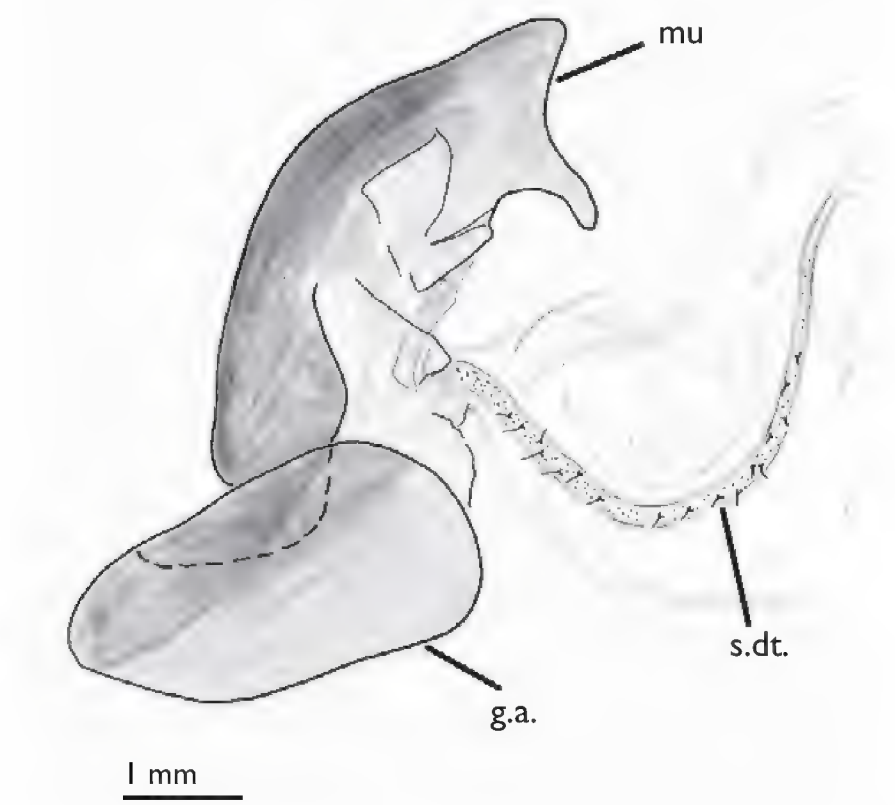

Figure 65. *Chrysopodes* (*Neosuarius*) *pecki*: Male genitalia (gonarcus, lateral). **g.a.** gonarcal apodeme **mu** mediuncus **s.dt.** setose duct on gonoscaccus.

without setae. Frons smooth, rounded laterally, shiny throughout. Clypeus mostly flat, rounded laterally, center without raised fold; surface smooth. Labrum flat; distal margin straight; dorsal surface smooth.

Head coloration: Head cream to tan; vertex with brown markings around edges of central raised area; brown stripe around mesal edge of dorsal torulus; torulus with another elongate brown stripe mesally; frontal torulus tan, with diffuse brown stripe below antennal base; frons tan to amber, lateral margins marked with reddish brown, with pair of crescent-shaped, dark brown marks below frontolateral margin of torulus; clypeus light brown. Genae cream, with brown longitudinal stripe. Scape tan, with brown at base; pedicel light brown; flagellum dark brown basally, becoming lighter brown, then tan distally, with dark brown setae basally, becoming amber distally. Maxillary palp with distal three segments mostly brown; basal two segments amber. Two distal segments of labial palp brown, basal segment amber. Venter mostly tan; area posterior to eyes with brown marks; stipes, galea with some brown markings.

Thorax (Fig. 40f): Pronotum wider than long: ~0.8–1.0 mm long; ~1.2–1.4 mm wide; cream to tan, with brown, crooked mesal stripe, pair of brown, crooked sublateral stripes (~0.2 mm wide), lateral margin brown anteriorly, sometimes entirely; numerous long, mostly black setae (longest ~0.20–0.25 mm long). Meso-, metanota cream to tan, with brown, sublateral markings; sparce brown setae on mesonotum, sparce amber setae on metanotum. Pleuron mostly brown. Legs cream, without markings; tarsi amber. Tarsal claws dark amber, curved without deep cleft or quadrate base, with few long amber setae.

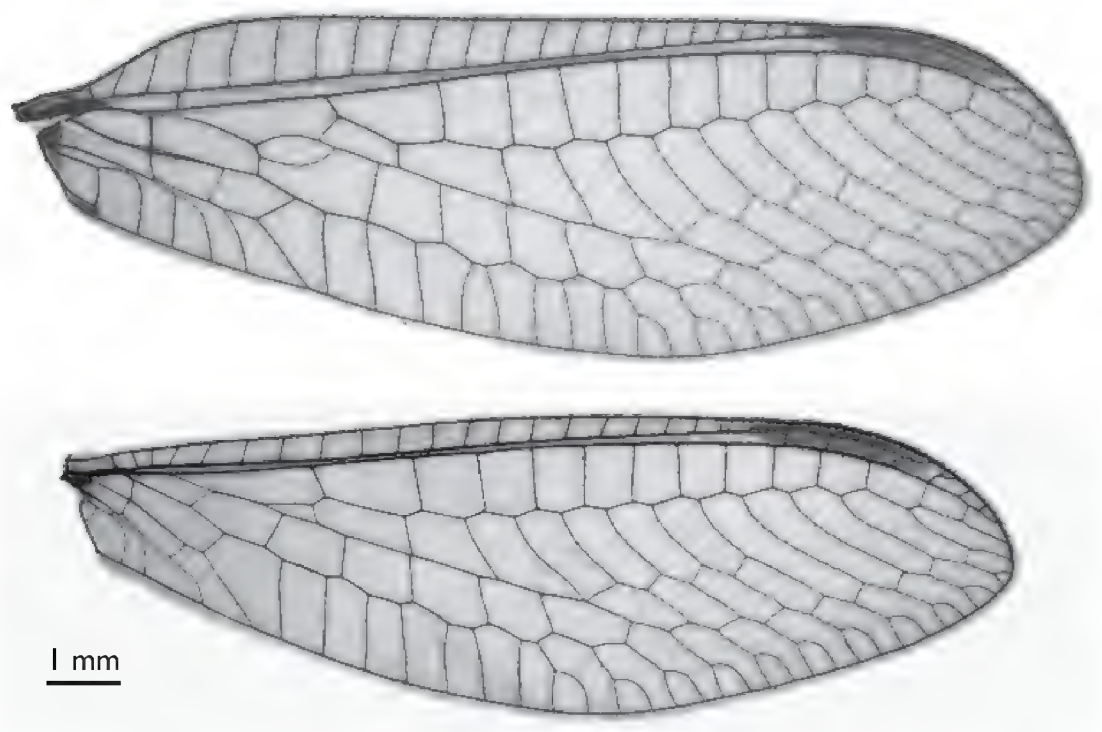

Figure 66. *Chrysopodes* (*Neosuarius*) *porterinus*: Forewing, hindwing (Chile, Santiago).

Wings (Fig. 66): Forewing 15.1–16.7 mm long, 4.9–5.3 mm wide; L:W ratio, 3.0–3.3; width greatest near midpoint, ratio maintained through distal 3/4th of wing, tapering at basal 1/4th; costal margin fairly straight, sloping gradually at base; apex ovate. Cu crassate at furcation of Cu1 and Cu2. Costal area slightly enlarged; height of tallest costal cell (#5, 6) = 4.3–5.3× length of first costal vein, 0.19× width of wing. Subcosta, radius almost straight; most subcostal veinlets, radial crossveins straight. Twelve to thirteen closed radial cells (between R and Rs), height of tallest radial cell 1.2–1.5× width; other than radial crossveins, only gradate veins in contact with PsM. Four b cells, four b' cells. First intramedian cell ovate, 0.6–0.7× width of third medial cell; inner row of four to five gradate veins; seven to eight outer gradate veins; both rows regularly stepped, parallel to each other distally. Second cell beneath Rs with i.g. at base = 1.7–2.0 mm tall, 2.7–3.2× width; third cell = 1.8–2.0 mm tall, 2.8–3.3× width. Second gradate cell 1.2–1.7 mm tall, 1.8–2.9× width; third gradate cell 1.1–1.6 mm tall, 1.8–3.0× width. Length of second cell beneath Rs with i.g. at base = 1.4–1.6× length of second gradate cell. Three intracubital cells; distal one open, icu1, icu2 each shorter than icu3; icu1 similar in length or 0.8× shorter that icu2. Vein 1A forked. Hindwing narrow, with tip ovate; 12.7–14.7 mm long, 4.3–4.8 mm wide. Eleven to twelve radial crossveins; four inner gradates; seven to eight outer gradate veins; three b cells, plus small t cell; four 4 b' cells; two intracubital cells, distal one open.

Wing coloration: Hyaline; costa pale; other longitudinal veins largely pale, dark at intersections; costal veinlets, radial crossveins, gradates, basal crossveins dark brown; terminal veinlets pale, with dark bases. Stigma slightly opaque, with brownish tinge.

Abdomen: Tergites 1–6, sternites 1–6 brown; pleural regions cream; T7, T8 brown sometimes with cream areas mesodistally; T9+ectoproct cream to tan, lower margin with brown mark along ventral apodeme; S7 brown, with cream distomesally; S8&9

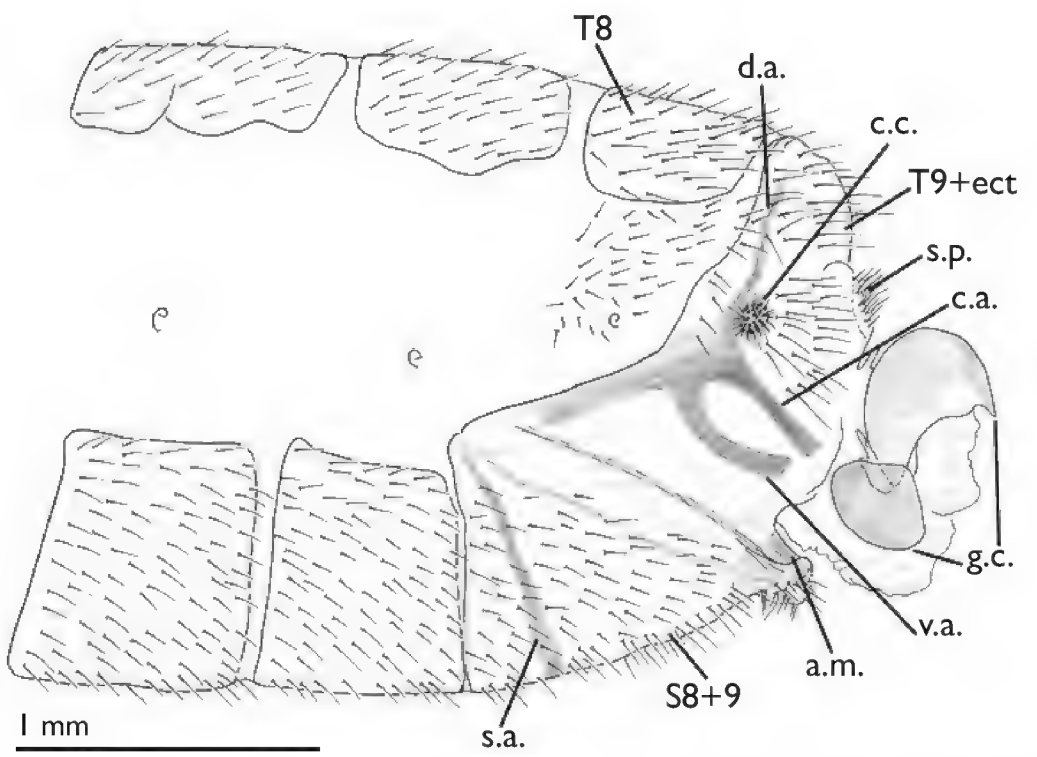

Figure 67. *Chrysopodes* (*Neosuarius*) *porterinus*: Male terminus, lateral (gonarcal complex inflated). **a.m.** heavy membranous plate on apex of S8+9 **c.a.** caudal arm of apodeme on T9+ectoproct **c.c.** callus cerci **d.a.** dorsal arm of apodeme on T9+ectoproct **g.c.** gonarcal complex **s.a.** submarginal apodeme on S8+9 **s.p.** setose subrectal plate **S8+9** fused eighth and ninth sternites **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct **v.a.** ventral arm of apodeme on T9+ectoproct.

(♂) cream to tan with brown stripe along upper margin. Callus cerci cream-colored, trichobothria light amber, short, thin. Tergite 6: roughly quadrate, with wavy ventral margins; length ~2.4–3.3 times greater than height (lateral view); with long, robust setae. Tergite 7 similar to T6, but only 2.0 times longer than tall. Pleural region P6, P7 with sparse, small setae. Sternite 6: quadrate, dorsal margin straight, length ~0.9–1.1× height, with long, straight, robust setae. Spiracles oval, not enlarged; atria not enlarged.

Male (Figs 67, 68): T8 rounded posteriorly, straight anteriorly (lateral view), with undifferentiated setose area extending ventrolaterally below spiracle. Left, right T9+ectoproct fused dorsally, slightly rounded distally, bearing vertical field of dense, long, robust setae distally; ventral area long, extending slightly below T7, to anterior edge of S8+9; ventral margin with heavy, thick, straight, apodeme; dorsal arm of apodeme extending behind callus cerci; two heavier arms extending ventrally from apodeme (ventral arm, caudal arm), both extending distomedially, ending in truncate terminus. Callus cerci oblong (0.19–0.20 mm tall, 0.13–0.14 mm wide), with 35–37 trichobothria. S8+9 ratio, length : height (basal), 1.3–1.6 : 1; with transverse, subbasal band, without ventral knob, invagination or apodeme; ventral margin slightly rounded; terminus trough-like, rounded, with distal margin bearing robust setae, with heavy, invaginated membrane bearing minute scales. Subanal plate distinct, well sclerotized, with dense, robust setae. Gonarcus broadly arcuate, fairly tightly attached to T9+ectoproct dorsally via short to medium-length, folded subanal membrane, bridge straight, not heavy; span of gonarcus near arch ~0.40 mm, distance between gonarcal apodemes distally ~0.82–0.91 mm. Gonarcal apodemes smooth, slightly scalloped,

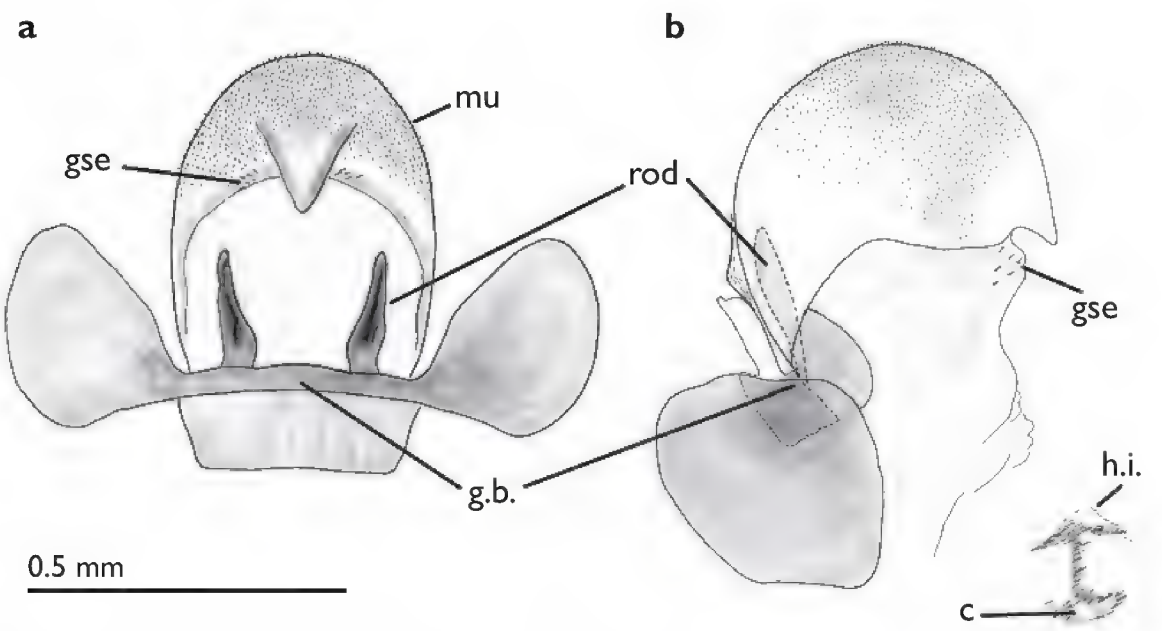

Figure 68. *Chrysopodes* (*Neosuarius*) *porterinus*: Male genitalia **(a)** gonarcus (ventral) **(b)** gonarcus (lateral), with hypandrium internum (dorsal) on right. **c** combes **g.b.** gonarcal bridge **gse** gonosetae **h.i.** hypandrium internum **mu** mediuncus **rod** internal rod of mediuncus.

rounded. Mediuncus flat basally, rounded, dome-like, with recurved beak distally, with pair of robust flanges internally extending from gonarcal bridge midway up dome; dorsal surface with dense covering of microsetae; membrane below mediuncus flat, straight, with two patches of ~5 pairs of very small gonosetae. Gonosaccus small, delicate, without gonosetae or much structure. Hypandrium internum weakly sclerotized (sometimes difficult to find), T-shaped, with slender, keel-like comes.

Female (Figs 48c, 69–71): Tergite 8: length ~1.4× height (lateral view); ventral extension with medium length setae; gonopophyses laterales with slightly shorter setae; pleural region with shorter, thinner setae; all segments with relatively small microsetae throughout. Tergite 9+ectoproct (lateral view) mostly vertical, not extending much beneath T8; proximal margin fairly straight throughout or with slight bulge mesally; distal margin extending well beneath ventral margin of gonopophyses laterales. Callus cerci slightly taller than broad (0.18 mm tall, 0.12–0.14 mm wide), with approximately 35–37 trichobothria. Gonopophyses laterales < 1/2 length of T9+ectoproct, ~3 times taller than wide, rounded dorsally, ventrally; orientated posteroventrally (<45° angle from midline). Sternite 7: with long, robust setae; lateral view: length ~1.5× height of proximal margin, with distal 1/5th sloping to terminus; terminus tall, rounded, with short, folded membrane. Subgenitale narrow, with base slightly rounded, fluted; distal process flat, triangular (frontal view), bilobed, with short neck, extending from base at less than right angle. Pair of large, bulbous bursal glands with elongate, narrow ducts opening dorsally on posterolateral margin of bursa; accessory ducts not observed. Bursa large, extending beyond spermatheca; dorsal surface with small longitudinal folds. Bursal duct not distinctly differentiated from bursa, transversely fluted, with most folds not sharp-edged. Spermatheca elongate, tubular, with single mesal bend, with a bean-shaped enlargement anteriorly (bursal end), open to bursa via elongate dorsal slit; spermatheca ~0.71–0.77 mm long, 0.12–0.13 mm diameter; invagination ~0.36 mm deep, ~0.06–0.07 mm wide; velum

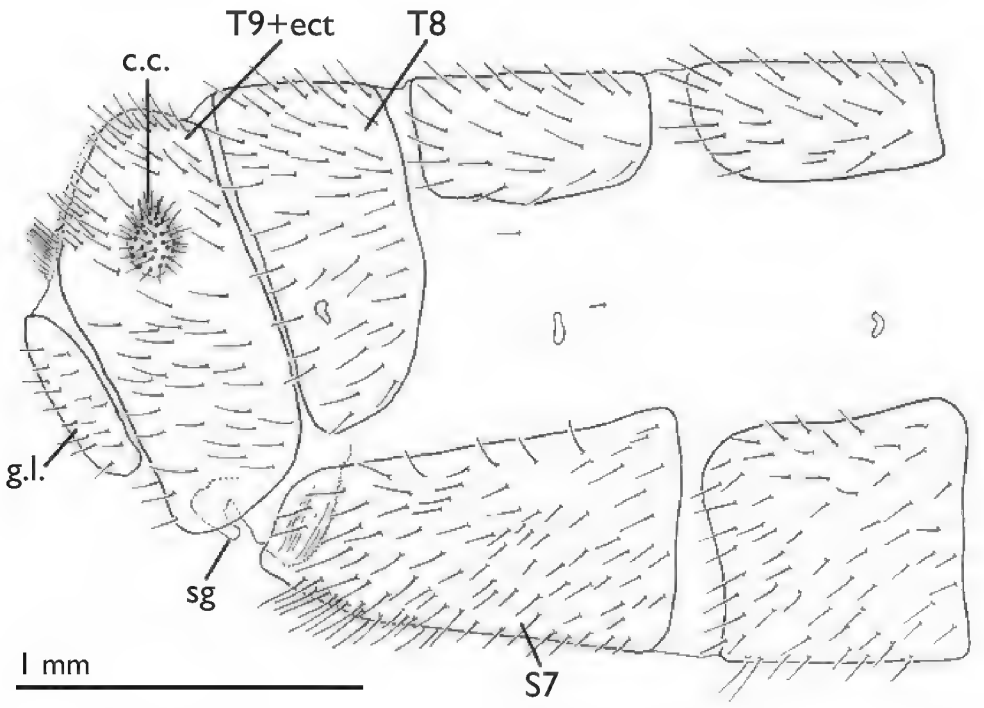

Figure 69. *Chrysopodes* (*Neosuarius*) *porterinus*: Female terminus, exterior, lateral. **c.c.** callus cerci **g.l.** gonapophysis lateralis **sg** subgenitale **S7** seventh sternite **T8** eighth tergite **T9+ect** fused ninth tergite and ectoproct.

not identified. Spermathecal duct relatively short, (0.70–0.74 mm long), arising from tip of spermatheca on dorsal, left side, extending into subgenitale, with one U-shaped curve; distal ~1/2 setose. Colleterial gland extending to sixth segment, with smooth texture; reservoir small, bulbous, slightly grainy texture, located immediately before transverse sclerotization; accessory glands not found. Transverse sclerotization well-formed, flat, ellipsoid plate, with elongate comb-like teeth, located mesally within gonopophyses laterales.

Larvae. Described by Monserrat and Freitas (2005).

Biology. Adult specimens were collected during all months from October through April; one unusual record is from June. Monserrat and Freitas (2005) reported the following: Newly laid eggs were light green; they hatched within 7–9 days of oviposition. Larvae that were given rose aphids [*Macrosiphum* (*Macrosiphum*) *rosae*] "pupated" [probably spun cocoons] in 23 days [temperature not specified].

Type material: *Chrysopa porterina* Navás. Navás (1910a: 47) indicated that the only type he had was an imperfect specimen (with antennae and abdomen missing). Thus, the specimen in the MZB that Navás labeled as the type (examined) is determined to be the Holotype (by monotypy). It is missing its antennae and abdomen, and its label data read: – (1) "Chile, 1908" [prob. Navás' hand]; (2) "Chrysopa porterina Nav., P. Navás S. J. det." [prob. Navás' hand; light green]; (3) "Typus" [pink]; (4) "Chrysopa (Suarius) porterina Navás, TYPE det. Adams 1974" [Adams' hand]; (5) "78-1700 MZB". A second specimen of *C. porterina* in the MZB (male, 78-1699 MZB, examined) is labeled "Cotypus" in Navas' hand; it was collected in Serena in I-25. Adams' label (1974) on the specimen indicates that he believed it is not a type, and I concur.

***Chrysopa tristella* Navás.** The Lectotype (examined) was designated by Legrand et al. [2008 (2009)]: 172); it is a female in the MNHN (examined), with its abdo-

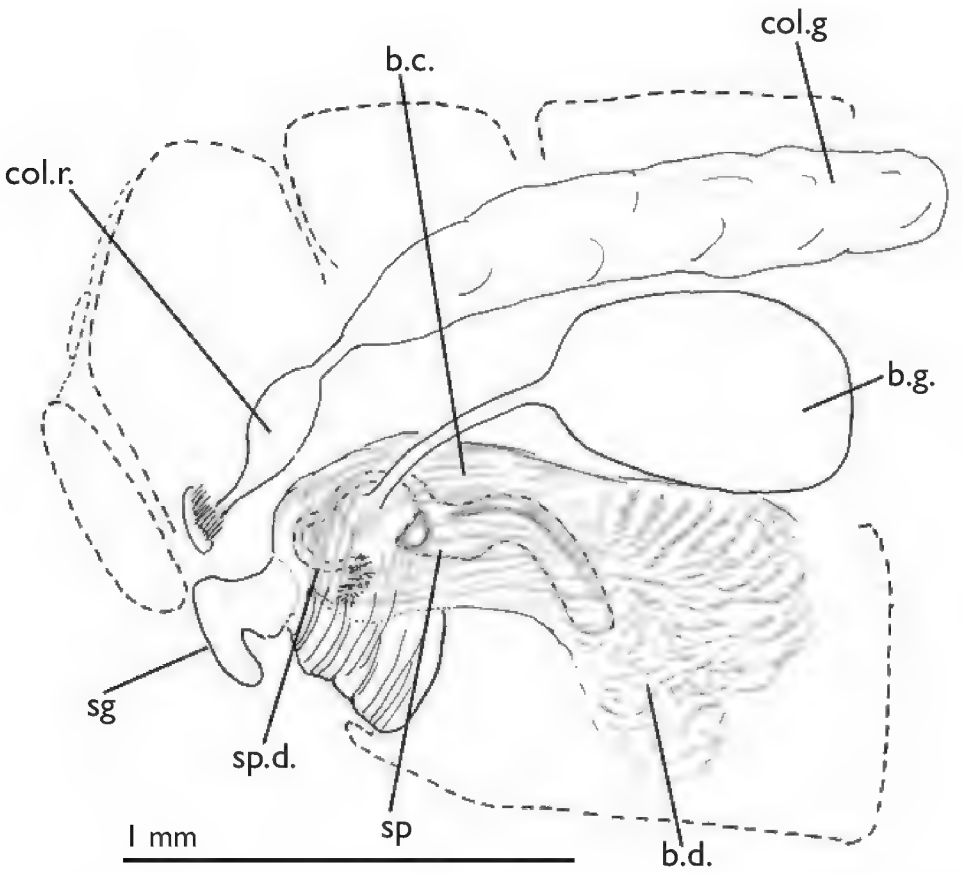

Figure 70. *Chrysopodes* (*Neosuarius*) *porterinus*: Female terminus, interior, lateral. **b.c.** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **col.g.** colleterial gland **col.r.** colleterial reservoir **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

men dissected (in glycerin, in microvial on pin). Its labels read: (1) "Marga Marga (Chile), Enero 1919"; (2) "Chrysopa tristella Nav. P. Navas S. J. det." [light green]; (3) "Typus" [pink]; (4) "Museum Paris, Longin Navas legit 19"; (5) "LECTOTYPE, *Chrysopa tristella* Nav., desig. J. Legrand & C. Tauber, 2008" [red]. The first three labels are in Navás' hand.

***Chrysopa ruizi* Navás.** Syntypes, with label data that coincide with the two localities in the original description, are in the SDEI (six specimens, examined) and the MZB (one specimen, examined). P. Adams intended to designate a male specimen in the SDEI as the Lectotype, but he did not publish the action. Here, the specimen that he chose is named as the Lectotype (present designation). Its labels read: (1) "CHILE, Choapa, II.1931, F. Ruiz" [printed, hand printed, probably not Navás' hand]; (2) "Chrysopa Ruizi Nav. det. Navás S.J." [green, hand printed, Navás hand; printed]; (3) "Lectotypus" [red]; (4) "C. ruizi Nav. 1934 = Suarius porterina Navás, det. P. Adams '77"; (5) "This specimen will be designated lectotype. P. Adams"; (6) "LECTOTYPE, *Chrysopa ruizi* Navás 1934, des. C. A. Tauber, 2010" [red]; (7) "*Chrysopodes* (*Neosuarius*) *porterinus* (Navás), ♂, det. C. A. Tauber 2009"; (8) "Coll. SDEI Müncheberg". The specimen is in good condition, with the male abdomen cleared, in glycerin.

Four other specimens in the SDEI are paralectotypes. Three of them (2M, 1 teneral F) carry labels with identical data as those on (1), (2), and (8) above, as well as labels reading: "Paralectotype, C. ruizi Nav., P. Adams det. '77"; "Paralectotypus" [red]; and "*Chrysopodes porterinus* (Navás), det. C. A. Tauber 2009". Two of these specimens also have a label that reads: "ded. Carlos Stuardo IV [or April] 1933".

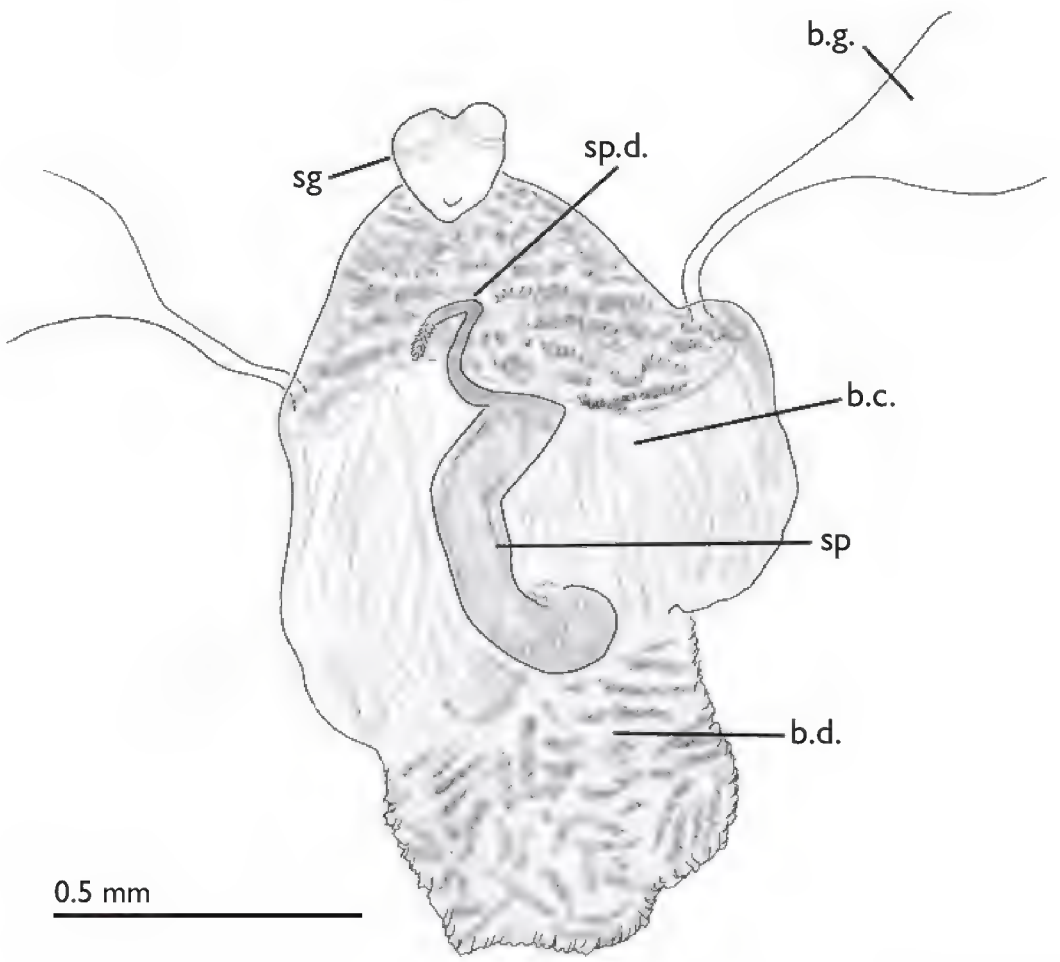

Figure 71. *Chrysopodes* (*Neosuarius*) *porterinus*: Female genitalia, ventral. **b.c** bursa copulatrix **b.d.** bursal duct **b.g.** bursal gland **sg** subgenitale **sp** spermatheca **sp.d.** spermathecal duct.

The fourth paralectotype, a female, from the SDEI has the following labels: (1) "Chile, El Canelo, 16.II.1933, Stuardo Col."; (2) "Chrysopa Ruizi Nav. det. Navás S.J." [green]; (3) "Paralectotype, C. ruizi Nav., P. Adams det. '77"; (4) "Paralectotypus" [red]; (5) "Suarius nosina ♀ det. Adams '77"; (6) "*Chrysopodes* (*Neosuarius*) *porterinus* (Navás), ♀, det. C. A. Tauber 2009"; (7) "Coll. SDEI Müncheberg".

Another specimen from El Canelo has a collection date after those reported in the original description; it is probably not from the syntype series and therefore should not be considered a paralectotype. Its labels read: (1) "El Canelo - Chile, Stuardo, coll., 29 [23?]. XI 33" [hand printed, probably Navás' hand]; (2) "Chrysopa Ruizi Nav. det. Navás S.J." [green]; (3) "Paralectotype, C. ruizi Nav., P. Adams det. '77"; (4) "Paralectotypus" [red]; (5) "Suarius nosina ♀ det. Adams '77"; (6) "*Chrysopodes* (*Neosuarius*) *porterinus* (Navás), ♀, det. C. A. Tauber 2009"; (7) "Coll. SDEI Müncheberg". The abdomen is in a small vial on a separate pin; it is labeled: (1) "Chrysopa ruizi Navás, Chile, El Canelo, 29.XI 33, Abdomen ♀; (2) "*Chrysopodes* (*Neosuarius*) *porterinus* (Navás), ♀, det. C. A. Tauber 2009

An additional specimen, determined by Navás as "*Chrysopa ruizi* Nav." is in the SDEI. It was not cited in the original description and thus is not a type. Its labels read: (1) "Chile, Termas de Cauquenes 15/IV.1933, Stuardo col."; (2) "Chrysopa Ruizi Nav., P. Navás S.J. det." (3) "Not a paralectotype since not cited by Navás 1934" [Adams' label]; (4) "*Chrysopodes* (*Neosuarius*) *porterinus* (Navás), ♀, det. C. A. Tauber 2009; (5) Coll. SDEI Müncheberg".

The specimen in the MZB is a paralectotype; it has the following labels: (1) "CHILE, Choapa, II.1931, F. Ruiz"; (2) "Chrysopa Ruizi Nav. det. Navás S.J." [green]; (3) "Tipo" [red, printed, Navás' hand]; (4) "Chrysopa (Suarius) porterina Navás, ♂, det. P. Adams '74"; (5) "PARALECTOTYPE, *Chrysopa ruizi* Navás, det. C. A. Tauber, 2008" [red]; (6) "*Chrysopodes porterinus* (Navás), det. C. A. Tauber 2008"; (7) "78-1696 MZB". The specimen is in good condition; the male genitalia are on a separate pin (in a vial with glycerin).

Specimens examined (in addition to the type material listed above). **ARGENTINA. Neuquén:** 10 km S. Los Colorados, I/19/1984, S. Smith & P. Gentili (1M, 2F, USNM); Ao Aucapan, 7 km. S. Pilolil, II/27/1978, C. M. & O. S. Flint, Jr. (1M, 2F, USNM); Ao. del Gato, 8 km. S. Rahue, III/2/1978, C. M. & O. S. Flint, Jr. (1M, 3F, USNM); Pucara, XI/1957 (2M, 5F, CAS); S. Martin de los Andes, I/1958, H. J. Molinari (1M, 4F, FSCA), I/28-II/20/1963 (1M, 1F, FSCA), I/15/1956 (1F, CAS), I/28–30/1963, II/2/1963, XI/23/1963 (8M, 10F, CAS); Pucara, XI/1957, Bought F. H. Walz (1M, 1F, FSCA; 1M, 4F, 1?, CAS). **Río Negro:** Pasoflores, II/8/1957 (3F, CAS). Fdo. Lo Rojas, XI/28/1966, E. Zuniga S. (1M, UCB). **CHILE. Antofagasta Region:** 7 k. N. Taltal, II/12/1989, R. Miller & L. Stange (2M, 4F, FSCA); 21 k. N. Taltal, II/24/1989, R. Miller & L. Stange (3M, 8F, FSCA); Quebrada de Paposo, 600 m., II/3/1989, II/23–25/1989, R. Miller & L. Stange (18M, 13F, FSCA); Paposo, 600 m, IX/17–20/1982, L. E. Pena (2F, 1M, CAS); Paposo, X/30/1983, L. E. Pena (1F, CAS), IX/21/1952 (1M, 1F, CAS). **Araucanía Region:** Angol, II/1/1958, D. S.Bullock (1F, USNM). **Atacama Region:** Copiapó Prov., 37 km W Copiapó; hand netted on inland dunes, X/29/2003, M. E. Irwin, 171 m; 27°21.02'S, 70°38.73'W, EI Schlinger Foundation Insect Expedition (1F, INHS); Chamonate, W. Copiapó, X/4/1980, L. E. Pena (1M, 2F, 1?, CAS); Copiapo, 1600 m, X/2/1980, L. E. Pena (2M, 2F, CAS); Juntas (Copiapó) 1600 m, X/2/1980, L. E. Pena (4M, 2F, CAS). Huasco, Huasco, XI/11/1989, R. Miller & L. Stange (1F, FSCA); Huasco, 15 k. N. Vallenar, II/10/1989, R. Miller & L. Stange (2F, FSCA); Vallenar, Rio Pinte, 1200 m, XII/2/1967 (3M, 3F, 2?, FSCA), X/25/1980, L. E. Pena (1?, CAS); S.E. Vallenar, Q. Pinte, 1600 m, X/25/1980, L. E. Pena (2F, 2?, CAS); Vallenar, IV/6/1945, E. A. Chapin (1M, USNM); Quebrada, Algodon, nr. Carrizal Bajo Atacama, VI/21/1958, L. E. Pena (2M, 1F, CAS); Juntas, 1600 m, X/2/1980, L. E. Pena (1M, FSCA); Q. el Salta sur Vallenar, X/27–28/1980, L.E. Pena (1?, FSCA; 2M, 3F, 12?, CAS); Q. El Salta Sur Freirina, X/27–28/1980, L. E. Pena (3M, 7F, CAS); Atacoma, El Transito, E. Vallenar, X/25/1980, L. E. Pena (1M, 1F, 1?, CAS); SE Vallenar, Conai, 1500m, X/25/1980, L. E. Pena (1M, CAS); W. Vallenar, Q. Maitencillo, X/11/1980, L. E. Pena (6M, 2?, CAS); 35 km N Vallenar, X/115/1980, L. E. Pena (1F, CAS); Q. El Salto, 750 m, X/27–28/1980, L. E. Pena (1M, teneral, CAS); Atacoma, N. Caldera, Q. El Leon, X/4/1980, L. E. Pena (1F, CAS); S.E. Caldera, X/26/1983, L. E. Pena (1F, CAS); 20–30 km SE Caldera, X/26/1983, L. E. Pena (2M, 2F, CAS); Fundo Talonquen, S. La Ligua, II/7–8/1986, L. E. Pena (1M, 2F, CAS); Sur Freinina, 750, X/27–28/1980, L. E. Pena (1F, 6?, CAS); Finca Chanaral, Meo Oro, X/17–18/1980, L. E. Pena (1M, 3F, CAS); Finca Chanaral, 1900 m, X/7–8/1980, L. E. Pena (3M, 2F, 4?, CAS). **Bíobío Region:** Conceptión, San Rosendo, R. & E. Shannon (1F, USNM);

Ñuble Prov., Recinto, III/4–6/1968, Flint & Pena (1F, USNM). **Coquimbo Region:** 15 km. E. Choros Bajos, Rio Los Choros, 300 m, XI/10–11/11981, D. & M. Davis (2M, 3F, USNM); N. Choros Bajos, X/19/1083, L. E. Pena (1?, CAS); LaVinto, Condoriaco, XI/10/1964, L. Peña (1M, CAS); Limarí, Combarabalá, XI/11/1992, Rozen, Sharkov, Snyder (3F, AMNH); Paihuano, 10 kms., Elqui Val XI/10/1964 (2M, 2F, CAS); Rivadavia, V/1936, Segovia, L. E. Peña [Santiago, Chile,] (1M, FMNH); Tongoy Beach area, I/24/1987, P Mazry (4F, SDNHM); Tongoy, II/3–5/1984. L. E. Pena (7M, 9F, CAS); Tofo, X/27/1956, L. E. Pena (1F, CAS); Socos, XI/2/1957, L. E. Pena (1F, CAS); Rio Turbio, X/28/2957, L. E. Pena (1F, CAS); Elqui, 11 km south Vicuña, X/26/1992, Rozen, Sharkov, Snyder (12M, 15F, AMNH); Elqui, 8.5 km south Vicuña, X/27–28/1992, Rozen, Sharkov, Snyder (1M, 3F, AMNH); La Vicuna, II/9/1989, R. Miller & L. Stange (1F, FSCA); Vicuña, X/20–21/1989, J. G. Rozen (1F, AMNH); S. Vicuña, 700m, X/17/1983, L. E. Pena (1F, CAS); Cuesta Cau'loleu Los Vilos, II/4–5/1986, L. E. Pena (2M, 5F, 2?, CAS) El Naranjo, S. Caimanes, II/6–7/1986, L. E. Pena (4M, 10 F, 1?, CAS); N. Amolanas, Q. los Maitenes, IX/27/1980, L. E. Pena, 2M, 1F, CAS); Salamanca, III/31/1956, L. E. Pena (1M, 1?, CAS). **Maule Region:** Curico, 6 km. E. Los Quenas, III/3/1989, R. Miller & L. Stange (1F, FSCA); Curicó: Rio Teno, 1300m, II/7–14/1965, L.E. Peña (22M, 16F, CAS); Curico, Tenlomo, V/27/1955, L. E. Pena (1F, CAS); Linares, Hornitos, 750 m, I/5/1986, P. Mazry (2M, 1?, SDNHM); Linares, Fundo Malcho I/9/1953, L. E. Pena (1F, CAS). **O'Higgins Region:** Leonera, Graneros, II/12–13/1986, L. E. Pena (1F, CAS); La Leonera, XII/30/1954, L. E. Pena (9M, 10F, CAS). **Santiago Region:** El Canelo, II/1952, L. E. Pena (1M, CAS), I/1953, L. E. Pena (2M, 1F, CAS); Guayacan, L. E. Pena, VI [Sic!]/2/1946 (1M, 2F, CAS), I/10/1951 (2M, 2F, CAS), I/24/1951 (1M, 1F, CAS), I/1951 (4M, 4F, CAS); Nr. Pta. Yeso, 1250 m ca., 70 km SE. Santiago, X/27–28/1981, D. & M. Davis (3 M, USNM); Rio Colorado, ca. 40km SE. Santiago, 1100m, X/29–31/1981, D. & M. Davis (6M, 4F, USNM); Cordellera, Rio Colorado, III/2/1989, R. Miller & L. Stange (2F, FSCA); El Alfalfal, II/29/1968, Flint & Pena (10M, 2F, 1?, USNM); Rio Colorado, IV/10/1953, L. E. Pena ((1F, CAS); Maipo, I/1951, L. E. Pena (5F, CAS); San Jose de Maipo, Rio Maipo, II/10–11/1986, L. E.Pena (6M, 11F, 2?, CAS); Rio Colorado, Maipo Canyon, 1000m, X/29–30/1981, L. E. Pena (4M, 3?, CAS); Rio Colorado, Rio Maipo Canyon, II/11–12/1986, L. E.Pena (1M, 2F, CAS); Los Maitenes, Rio Maipo, III/2/1964, L. E. Pena (5M, 13F, 2?, CAS); Portezuelo, 7 km N Santiago, 500 m, X/22–25/1981, D. & M. Davis (1M, teneral, USNM); Colina, III/1980, L. E. Pena (3M, 4F, 9?, CAS); Colina, El Portezuela, III/12/1985, II/8–10/1986, L. E. Pena (2F, CAS); Santiago, X/1–3/1951, L. E. Pena-G. (4F, CUIC); 28 km. E. El Volcan, 1800 m., XII/2/1960, R. E. Leech (1M, BPBM); Chacabuco, Canteras de Colina, 33°19'S:70°41'W, XII/9/1993, C. & O. Flint, Jr. (1F, USNM); Cordillera, Rio Colorado, III/2/1989, R. Miller & L. Stange (1F, FSCA); Q. Guayacan, Canelo, 900 m XII/1946, L. E. Pena-G. (3F, CUIC); Los Mailenesi, Rio Molpo, X/10/1964, L. E. Pena (1F, CAS); Lampa, XI/2/1984, L. E. Pena (1M, 1F, CAS). **Valparaíso Region:** Aconcagua, Guardia Vieja, XII/6/1961, L. Pena (3M, 6F, USNM; 3M, 2F, CAS), XII/26–28/1986, D. Pendleton (2M, 8F, SDNHM); Acgua., Rio Blanco, III/10/1968, Flint & Pena (2M, 2F, 2?, USNM); Aconcagua, El Tartaro,

II.4–16/1984, L. E. Pena (1M, 1F, CAS). Petorca, Pichidangui, I/16/1986, L. E. Pena (1F, CAS). Valparaíso, Cuesta Zapata, 531 m., 15 kn. E. of Casablanca, XI/8/1981, T. T. Schuh & N. I. Platnick (1M, AMNH). Cuesta El Melon, XI/14–16/1985, L. E. Pena (4M, 1F, CAS); Cerro la Campana, V/4/1959, L. E. Pena, (1M, CAS).

Known distribution. Argentina, Chile.

Variation. There is some variation in size and in the depth of the dark markings on the vertex and thorax. The neck at the base of the process at the base of the subgenitale varies in length; in some cases, it approaches the length of the neck on the *C.* (*N.*) *flavescens* subgenitale. However, it always connects with the terminus in a sharp angle.

Chrysopodes (Neosuarius) karinae Freitas and Penny, 2001, *Incertae Sedis*

Chrysopodes (*Neosuarius*) *karinae* Freitas and Penny, 2001: 276 [description]; locality data: "Bra-SP-Jaboticabal, FCAV, 24/IV/99, Takahashi, K. M., 82♀."; Oswald 2007 [catalog listing].

Diagnosis. *Chrysopodes* (*N.*) *karinae* was described from a single female specimen (the holotype); I have not seen it. According to the original description, this species is distinguished from other *Chrysopodes* (*Neosuarius*) by its dark flagellum, scapes with lateral mark, pale palpi, long pronotum, elongate, crooked spermatheca, and subanal plate with small setae and lateral pockets.

Several features mentioned in the description and shown on the illustrations appear to be more consistent with subgenus *Chrysopodes* than *Neosuarius*; these features include fairly wide forewings, abdomen with a knobbed terminal sternite, and an elongate, narrow spermatheca. The description makes no mention regarding the structure of the mandibles. Until the type becomes available for study, I consider the species as "*Incertae Sedis*".

Type material. ***Chrysopodes (Chrysopodes) karinae*** **Freitas & Penny.** The female holotype was reported to be deposited in the MZUSP. It is not in the collection and the authors have not yet made it available for study.

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References

Adams PA (1975) Status of the genera *Ungla* and *Mallada* Navás (Neuroptera: Chrysopidae). Psyche 82: 167–173.

Adams PA (1985) Notes on *Chrysopodes* of the M.N.H.N. in Paris [Neuroptera, Chrysopidae]. Revue Française d'Entomologie (N.S.) 7: 5–8.

Adams PA, Penny ND (1985) [1987] Neuroptera of the Amazon Basin, Part 11a. Introduction and Chrysopini. Acta Amazonica 15: 413–479.

Adams PA, Penny ND (1986) Faunal relations of Amazonian Chrysopidae. In: Gepp J, Aspöck H, Hölzel H (Eds) Recent Research in Neuropterology. Proceedings of the 2nd International Symposium on Neuropterology (21–23 August 1984, Hamburg, Germany; held in association with the XVII International Congress of Entomology). Privately printed, Graz, Austria. 119–124.

Alayo D (1968) Los Neurópteros de Cuba. Poeyana Instituto de Biologia (B)2: 1–127.

Albuquerque GS, Tauber CA, Tauber MJ (2001) *Chrysoperla externa* and *Ceraeochrysa* spp.: potential for biological control in the New World tropics and subtropics. In: McEwen PK, New TR, Whittington AE (Ed) Lacewings in the crop environment. Cambridge University Press, Cambridge, 408–423.

Aspöck U (2002) Male genital sclerites of Neuropterida: an attempt at homologisation (Insecta: Holometabola). Zoologischer Anzeiger 241: 161–171.

Baert L, Desender K, Peck SB (1992) New data on the Neuroptera of the Galápagos Islands, Ecuador. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique. Entomologie 62: 143–147.

Banks N (1911) Descriptions of new species of North American neuropteroid insects. Transactions of the American Entomological Society 37: 335–360.

Banks N (1914) New American Chrysopidae. Canadian Entomologist 46: 24–27.

Banks N (1915) New neuropteroid insects, native and exotic. Proceedings of the Academy of Natural Sciences of Philadelphia 66: 608–632.

Banks N (1924) Neuroptera from the Williams Galapagos expedition. Zoological 5: 177–180.

Banks N (1938) New Chrysopidae and species new to the United States. Canadian Entomologist 70: 118–122.

Banks N (1944) Neuroptera of northern South America. Part III. Chrysopidae. Boletín de Entomología Venezolana 3: 1–34.

Banks N (1948) [1949] Chrysopidae (Nothochrysidae) collected in Mexico by Dr. A. Dampf (Neuroptera). Psyche 55: 151–177.

Blanchard CÉ (1851) Mirmeleonianos. Pp. 119–129, and Rafidianos. In: Gay, C (Ed) Historia Fisica y Politica de Chile. Zoologia, Vol. 6 [of 8], 1851. Atlas, Vol. 2 [of 2], 1854. Paris, 129–135.

Brooks SJ (1997) An overview of the current status of Chrysopidae (Neuroptera) systematics. Deutsche Entomologische Zeitschrift, Berlin (N.F.) 44: 267–275.

Brooks SJ, Barnard PC (1990) The green lacewings of the world: a generic review (Neuroptera: Chrysopidae). Bulletin of the British Museum of Natural History, Entomology 59: 117–286.

Eisner T, Silberglied RE (1988) A chrysopid larva that cloaks itself in mealybug wax. Psyche 95: 15–19.

Flint OS, Jr. (2002) List of the name-bearing Neuropterida types in the collection of the National Museum of Natural History, Smithsonian Institution, USA. In: Sziráki G (Ed) Neuropterology 2000. Proceedings of the Seventh International Symposium on Neuropterology, Budapest (Hungary), August 2000. Acta Zoologica Academiae Scientiarum Hungaricae 48 (Suppl. 2): 89–98.

Freitas S. de, Penny ND (2001) The green lacewings (Neuroptera: Chrysopidae) of Brazilian agro-ecosystems. Proceedings of the California Academy of Sciences (4) 52: 245–395.

Hagen HA (1861) Synopsis of the Neuroptera of North America, with a list of the South American species. Smithsonian Miscellaneous Collections 4(1): xx + 1–347.

Henry CS, Penny ND, Adams PA (1992) The neuropteroid orders of Central America (Neuroptera and Megaloptera). In: Quintero D, Aiello A (Eds) Insects of Panama and Mesoamerica: Selected Studies. Oxford University Press, Oxford, 432–458.

Klimaszewski J, Kevan DK McE, Peck SB (1987) [1988] A review of the Neuroptera of the Galápagos Islands with a new record for *Sympherobius barberi* (Banks) (Hemerobiidae). Canadian Journal of Zoology 65: 3032–3040.

Kolbe HJ (1888) Die geographische Verbreitung der Neuroptera und Pseudoneuroptera der Antillen, nebst einer übersicht über die von Herrn Consul Krug auf Portoriko gesammelten Arten. Archiv für Naturgeschichte 54: 153–178.

Legrand J, Tauber CA, Albuquerque GS, Tauber MJ (2008) [2009] Navás types and non-type specimens of Chrysopidae in the MNHN, Paris (Neuroptera). Revue Française d'Entomologie (N.S.) 30: 103–183.

Linsley EG (1977) Insects of the Galápagos Islands (supplement). Occasional Papers of the California Academy of Sciences 125:1–50.

Linsley EG, Usinger RL (1966) Insects of the Galápagos Islands. Proceedings of the California Academy of Sciences 33 (7): 113–196.

McLachlan R (1868) [1867] New genera and species, &c., of neuropterous insects; and a revision of Mr. F. Walker's British Museum Catalogue of Neuroptera, part ii. (1853), as far as the end of the genus *Myrmeleon*. Journal of the Linnean Society of London, Zoology 9: 230–281.

Monserrat VJ (1985) Lista de los tipos de Mecoptera y Neuroptera (Insecta) de la colección L. Navás, depositados en el Museo de Zoología de Barcelona. Miscellània Zoològica 9: 233–243.

Monserrat VJ, Freitas S de (2005) Contribución al conocimiento de los crisópidos de Coquimbo, Patagonia y Tierra del Fuego (Argentina, Chile) (Insecta, Neuroptera, Chrysopidae). Graellsia 61: 163–179.

Navás L (1910a) Crisópidos (Ins. Neur.) nuevos. Brotéria (Zoológica) 9: 38–59.

Navás L (1910b) Nueva especie de neuróptero. Revista Chilena de Historia Natural 14: 70.

Navás L (1910c) Neurópteros chilenos (1.a serie). Revista Chilena de Historia Natural 14: 235–241.

Navás L (1912–1913) Les Chrysopides (Ins. Névr.) du Musée de Londres [Ia]. Annales de la Société Scientifique de Bruxelles 37 (pt. 2): 292–330.

Navás L (1913) Crisópidos sudamericanos. Brotéria (Zoológica) 11: 73–104, 149–168.

Navás L (1913–1914) Les Chrysopides (Ins. Névr.) du Musée de Londres [Ib]. Annales de la Société Scientifique de Bruxelles 38 (pt. 2): 73–114.

Navás L (1918) Insectos chilenos. Boletín de la Sociedad Aragonesa de Ciencias Naturales 17: 212–230.

Navás L (1920) Sur des Névroptères nouveaux ou critiques. Première [I] série. Annales de la Société Scientifique de Bruxelles 39 (pt. 2): 27–37.

Navás L (1921a) [1922] Insectos sudamericanos. Cuarta [IV] serie. Revista de la Real Academia de Ciencias Exactas Físicas y Naturales de Madrid 19: 255–267.

Navás L (1921b) [1923] Algunos insectos de Chile [I]. Revista Chilena de Historia Natural 25: 443–445.

Navás L (1922a) Sur des Névroptères nouveaux ou critiques. Sixième [VI] série. Annales de la Société Scientifique de Bruxelles 42 (pt. 1): 166–173.

Navás L (1922b) [1924] Insectos de la Argentina y Chile. Estudios. Revista Mensual (Academia literaria del Plata, Buenos Aires) 22: 358–368.

Navás L (1923) [1924]. Crisópidos (Ins. Neur.) neotrópicos [I]. Revista Chilena de Historia Natural 27: 110–116.

Navás L (1925a) Mas Crisópidos (Neur.) de Cuba. Boletín de la Sociedad Entomologica de España 8: 85–88.

Navás L (1925b) Crisópidos (Ins. Neur.) neotrópicos. Segunda [II] serie. Revista Chilena de Historia Natural 29: 8–13.

Navás L (1925c) Insectos neotrópicos. 1.a serie. Revista Chilena de Historia Natural 29: 305–313.

Navás L (1926) Insectos neotrópicos. 2.a serie. Revista Chilena de Historia Natural 30: 326–336.

Navás L (1927) Insectos neotrópicos. 3.a serie. Revista Chilena de Historia Natural 31: 316–328.

Navás L (1928) Insectos del Museo de Hamburgo. Primera [I] serie. Boletín de la Sociedad Entomologica de España 11: 59–67, 90–100, 121–138.

Navás L (1929a) Insecta nova. Series XIII. Memorie dell'Accademia Pontifica dei Nuovi Lincei, Rome (2) 12: 15–23.

Navás L (1929b) [1930] Insectos neotrópicos. 5.a serie. Revista Chilena de Historia Natural 33: 17–24.

Navás L (1932a) Insectos suramericanos. Quinta [V] serie. Revista de la Real Academia de Ciencias Exactas Físicas y Naturales de Madrid 29: 53–66.

Navás L (1932b) [1933] Insectos de la Argentina y Chile. 3.a serie. Revista de la Sociedad Entomológica Argentina 5: 79–86.

Navás L (1933a) Algunos insectos de Chile. 5.a serie (as 4.a serie). Revista Chilena de Historia Natural 37: 230–234.

Navás L (1933b) Insectos neotrópicos. 8.a serie. Revista Chilena de Historia Natural 37: 194–197.

Navás L (1934) Insectos suramericanos. Octava [VIII] serie. Revista de la Real Academia de Ciencias Exactas Físicas y Naturales de Madrid 31: 9–28.

Núñez Z. E (1989) Chrysopidae (Neuroptera) del Perú y sus especies más comunes. Revista Peruana de Entomología 31: 69–73.

Oswald JD (2006) Bibliography of the Neuropterida: a working bibliography of the literature on extant and fossil Neuroptera, Megaloptera and Raphidioptera (Insecta: Neuropterida) of the World. Version 7.06. http://insects.tamu.edu/research/neuropterida/neur_bibliography/bibhome.html. [accessed April 1, 2008 – January 12, 2010].

Oswald JD (2007) Neuropterida Species of the World. Version 2.0. http://lacewing.tamu.edu/species-catalogue/. [accessed April 1, 2008 – January 12, 2010].

Oswald JD, Contreras-Ramos A. Penny ND (2002) Neuroptera (Neuropterida). In: Bousquets JL, Morrone JJ (Eds) Biodiversidad, Taxonomía y Biogeografía de Artrópodos de México: hacia una síntesis de su conocimiento, Vol. 3. Universidad Nacional Autónoma de México, Distrito Federal, Mexico. 559–581.

Parkin P, Parkin DT, Ewing AW, Ford HA (1972) A report on the Arthropods collected by the Edinburgh University Galapagos Islands Expedition, 1968. Pan-Pacific Entomologist 48: 100–107.

Peck SB (2001) Neuroptera. In: Peck SD (Ed) Smaller Orders of Insects of the Galápagos Islands, Ecuador: Evolution, Ecology, and Diversity. National Research Council Canada, 269–274.

Penny ND (1977) [1978]. Lista de Megaloptera, Neuroptera e Raphidioptera do México, América Central, ilhas Caraíbas e América do Sul. Acta Amazonica 7 (4) (Suplemento): 1–61 [Errata: printed on a free slip of paper inserted in the work].

Penny ND (1998) New Chrysopinae from Costa Rica (Neuroptera: Chrysopidae). Journal of Neuropterology 1: 55–78.

Penny ND (2001) New species of Chrysopinae (Neuroptera: Chrysopidae) from Costa Rica, with selected taxonomic notes and a neotype designation. Entomological News, Philadelphia 112: 1–14.

Penny ND (2002) Family Chrysopidae. Pp. 187–227 (text), 301–373 (figures) in Penny ND (Ed) A Guide to the Lacewings (Neuroptera) of Costa Rica. Proceedings of the California Academy of Sciences (4) 53: 161–457.

Penny ND, Adams PA, Stange LA (1997) Species catalog of the Neuroptera, Megaloptera, and Raphidioptera of America North of Mexico. Proceedings of the California Academy of Sciences (4) 50: 39–114.

Principi MM (1948–1949) [1949] Contributi allo studio dei Neurotteri Italiani. VIII. Morfologia, anatomia e funzionamento degli apparati genitali nel gen. *Chrysopa* Leach (*Chrysopa septempunctata* Wesm. e *C. formosa* Brauer). Bollettino dell'Istituto di Entomologia della [R.] Università di Bologna 17: 316–362.

Principi MM (1954) Contributi allo studio dei Neurotteri Italiani. XI. *Chrysopa viridana* Schn. Bollettino dell'Istituto di Entomologia della [R.] Università di Bologna 20: 359–376.

Schneider WG [as: G. T.] (1851) Symbolae ad monographiam generis Chrysopae, Leach. Apud Ferdinandum Hirt, Vratislaviae. 178 pp.

Smith RC (1931) The Neuroptera of Haiti, West Indies. Annals of the Entomological Society of America 24: 798–823.

Tauber CA (2003) Generic characteristics of *Chrysopodes* (Neuroptera: Chrysopidae), with new larval descriptions and a review of species from the United States and Canada. Annals of the Entomological Society of America 96: 472–490.

Tauber CA (2007) Review of *Berchmansus* and *Vieira* and descriptions of two new species of *Leucochrysa* (Neuroptera: Chrysopidae). Annals of the Entomological Society of America 100: 110–138.

Tauber CA, Adams PA 1990 Systematics of the Neuropteroidea: present status and future needs. In: Kosztarab M, Schaefer CW (Eds) Systematics of the North American Insects and Arachnids: Status and Needs. Virginia Agricultural Experiment Station Information Series 90–1. Virginia Polytechnic Institute and State University, Blacksburg, 151–164.

Tauber CA, Tauber MJ (2010) Two new endemic species of *Chrysopodes* (*Neosuarius*) (Neuroptera: Chrysopidae) from the Galápagos Islands. ZooKeys 42: 47–78.

Tauber CA, de León T, López-Arroyo JI, Tauber MJ (1998) *Ceraeochrysa placita* (Neuroptera: Chrysopidae): generic characteristics of larvae, larval descriptions, and life cycle. Annals of the Entomological Society of America 91: 608–618.

Tauber CA, de León T, Penny ND, Tauber MJ (2000) The genus *Ceraeochrysa* (Neuroptera: Chrysopidae) of America North of Mexico: larvae, adults, and comparative biology. Annals of the Entomological Society of America 93: 1195–1221.

Tauber CA, Tauber MJ, Albuquerque GS (2008a) A new genus and species of green lacewings from Brazil (Neuroptera: Chrysopidae: Leucochrysini). Annals of the Entomological Society of America 101: 314–326.

Tauber CA, Tauber MJ, Albuquerque GS (2008b) *Gonzaga nigriceps* (McLachlan) (Neuroptera: Chrysopidae): descriptions of larvae and adults, biological notes, and generic affiliation. Proceedings of the Entomological Society of Washington 110: 417–438.

Tauber CA, Albuquerque GS, Tauber MJ (2008c) A new species of *Leucochrysa* and a redescription of *Leucochrysa* (*Nodita*) *clepsydra* Banks (Neuroptera: Chrysopidae). Zootaxa 1781: 1–19

Tjeder B (1954) Genital structures and terminology in the order Neuroptera. Entomologiske Meddelelser 27:23–40.

Tjeder B (1966) Neuroptera-Planipennia. The Lace-wings of Southern Africa. 5. Family Chrysopidae. In: Hanström B, Brinck P, Rudebec G (Eds) South African Animal Life. Vol. 12. Swedish Natural Science Research Council, Stockholm, 228–534.

Tjeder B (1970) Neuroptera. In: Tuxen SL [P.] (Ed) Taxonomist's glossary of genitalia in insects. 2nd edition. Munksgaard, Copenhagen, 89–99.

Tsukaguchi S (1995) Chrysopidae of Japan (Insecta, Neuroptera). Privately printed, Osaka, Japan. [i]-[ii], 1-[224] pp.

Valencia Luna LA, Nápoles JR, Valdez Carrasco J, Carrillo Sánchez JL, López Martínez V (2006) Taxonomía y registros de Chrysopidae (Insecta: Neuroptera) en el estado de Morelos, México. Acta Zoológica Mexicana (n.s.) 22: 17–61.

Walker F (1853) List of the specimens of neuropterous insects in the collection of the British Museum. Part II.–(Sialides–Nemopterides). British Museum, London. [iii] + 193–476.